ELECTRICAL REVIEW

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Managing Editor: HUGH S. POCOCK, M.I.E.E. *Technical Editor:* W. O. FENWICK, M.I.E.E.
Industrial Editor: J. H. COSENS *Technical Consultant:* C. O. BRETTELLE, M.I.E.E.

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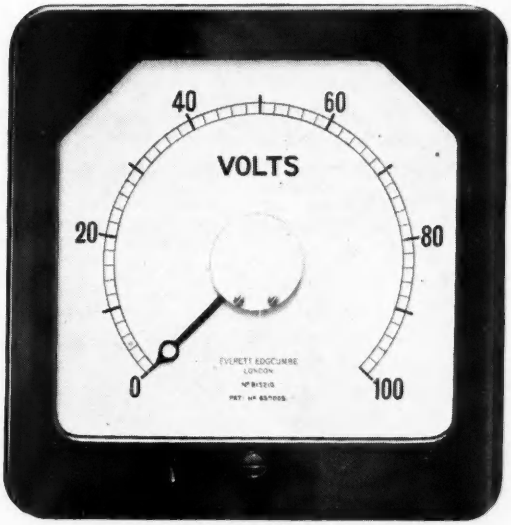

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ELECTRICAL REVIEW 5th DECEMBER, 1952

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872 • VOL. CLI • NO. 3915

Self Defence

FOR some years now the *Electrical Review* has been doing its best to prevent serious damage being done to the electricity supply, manufacturing, contracting and retailing industries by the persistent propaganda against the use of electricity. We have realized, of course, that plant and coal shortages have necessitated a different sort of approach to electrical development, involving a certain amount of education for the consumer. Unfortunately these shortages have provided ammunition for both interested and disinterested parties in their attacks on electricity.

Also on account of insufficient plant, the British Electricity Authority and Area Boards have had to be cautious in their publicity —in fact much of it has been of a negative character. Now that, for various reasons, the situation has become easier the electricity authorities continue to feel the effects of their enforced caution and are actually perturbed at the way in which progress has been damped down. This concern is shared by the manufacturers of domestic electrical appliances who have seen their home sales falling off (a movement assisted by excessive purchase tax in many cases), while restrictive measures adopted by overseas Governments have reduced their export trade.

The electricity authorities are still forbidden to resume full " promotional " advertising and until this restraint is removed it is incumbent upon the rest of the electrical industry to do what it can. An Electricity Development Committee has been set up by the British Electrical & Allied Manufacturers' Association to devise measures for encouraging electrical applications (particularly domestic use) and combating anti-electric propaganda. It is also hoped that a small Parliamentary group, headed by Sir Arnold Gridley and Mr. F. J. Erroll, both well known in the electrical industry, which has got together for the purpose, will influence Members of Parliament to take more reasonable views of the position and counter the anti-electrical activities of some of them.

A very good and genuine case can be made for the extended use of electricity but it is essential that the methods of presenting it shall be well-reasoned and forcible. There must be no apologies for advocating the most civilized way of life. Full use must be made of the knowledge and experience of those in the industry best qualified to handle the subject.

FLUE GAS WASHING

Removal of sulphur from power station flue gases is not only costly but, as has been previously pointed out in these columns, also defeats its own object. Acid raises the dew-point temperature and consequently the velocity at which the gases leave the chimneys, so that their acid content is blown high into space and harmlessly dispersed. Vapour from washed gases, however, being at a relatively low temperature, leaves at chimney-top level, spreading out to settle locally. The subject is discussed in a paper which is to be presented by Mr. R. Llewellyn Rees at the next meeting of the Institute of Fuel, particulars of which appear on page 1210 of this issue.

VOLTA RIVER SCHEME

For some time past the development of the Volta River in the Gold Coast has been discussed as a possibility. Now the first positive steps are being taken by the Governments of the United Kingdom and the Gold Coast, together with two aluminium companies, to realize the scheme. A White Paper (reviewed in this issue) sets out proposals for erecting an aluminium smelter to handle bauxite found in the territory and a power station with an ultimate capacity of 564,000 kW. A total capital investment of £144 million is envisaged of which the power plant would account for £54 million. The project is of immense importance to this country as a means of replacing dollar-source aluminium with metal produced in the sterling area and it is of equal interest to British manufacturers of electrical plant.

PUBLIC SERVICE

The most cordially welcomed theme of the Minister of Fuel and Power and other speakers at the E.P.E.A. dinner in London last week concerned the eschewing of party politics in relation to the nationalized services. The criterion is the single-minded aim of giving the most efficient service to the public. This duty-first tradition has long been established in the electricity supply industry, the good of which is the first of the declared aims of the Association, whose members realize that in this way their legitimate material interests are best furthered. They are also, of course, properly concerned that the conditions of employment shall be such as to attract the best qualified candidates for the key positions for which the Association caters.

EXPORTERS' AID

When the first edition of the BEAMA Catalogue appeared three years ago British exporters were enjoying the benefits of a sellers' market. The Catalogue's main purpose was to tell overseas buyers who supplied particular items of equipment and thus save them trouble when they were seeking to place orders which they probably intended to place here anyway. Now, as the second edition is made available, the scene is much altered. The first rush of post-war orders has been met and British manufacturers are having to *sell* their goods against rising competition, including that of a resurgent Germany and Japan. The Catalogue serves this purpose very well and should prove a potent aid in the maintenance of Great Britain's electrical export trade.

Electricity in Remote Areas

Creating a Demand for Electrical Appliances

By J. RITCHIE*

THE old slogan "Trade Follows the Flag" might well be replaced in electrical circles by "Trade Follows the Overhead Lines." As soon as an electricity supply system is established in any district, a valuable market in house wiring equipment and electrical appliances immediately develops, and it is significant that the demand for electrical appliances is very marked in the more remote rural areas in which supplies of electricity have only comparatively recently become available.

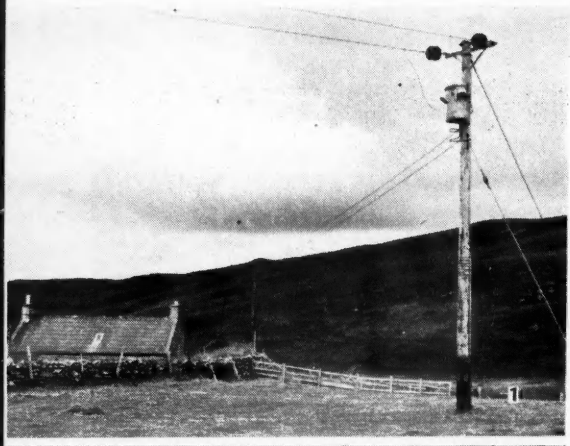
Statistical information on this subject, published in connection with recent development schemes in comparatively remote districts, summarized below, shows how large are the actual and potential markets for electrical appliances in these territories.

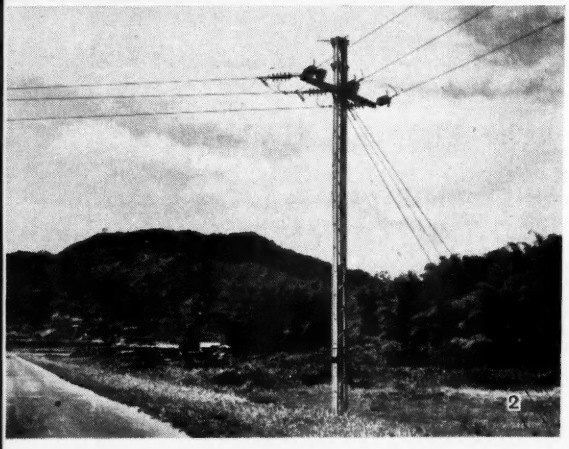
From the point of view of expanding overseas trade, there are two lessons to be learned from these significant facts. First, that every possible encouragement should be given to British firms which are prepared to undertake contracts for the construction of overhead power lines in foreign territories, contracts which are often hazardous from a financial aspect and entail more than an ordinary share of the pioneering spirit among the staff employed. Secondly, that the establishment of an electricity supply system in any overseas territory should be immediately followed by a systematic sales effort by the manufacturers of electrical appliances.

The North of Scotland Hydro-Electric Board, in written evidence submitted to a commission of inquiry into crofting conditions in the Scottish Highlands, made brief mention of the use of electrical appliances in a recently electrified rural area. Skye and Lochalsh, the area cited in the evidence, consists of the island of Skye interconnected with an area on the adjoining mainland. This area, isolated insofar as supplies are concerned from the remainder of the Board's territory, forms a compact unit in which a close survey is possible of the

* British Insulated Callender's Construction Co., Ltd.

Above : **Low-voltage service line to a croft at Bigton, North Scotland**





(1) Three-phase 11 kV angle-section pole in Lerwick–Bixter main line in Scotland

(2) Angle pole in the 66 kV line to Penal (Trinidad and Tobago Electricity Commission)

impact of electricity on the lives of the country people living within its borders.

Information presented in the 1950 and 1951 annual reports of the Hydro-Electric Board has enabled the main characteristics of electricity supply in the Skye and Lochalsh area to be tabulated in Table I.

The table shows that in the third year after the introduction of electricity into this area, 191 miles of overhead line have been erected to serve 1,715 consumers, an average of nine consumers per mile of line. Between them, these consumers use 591 cookers, 656 kettles, 717 irons, 710 fires, 90 water heaters, 97 wash-boilers, 67 washing machines and 93 vacuum cleaners, despite the inflated post-war cost of appliances. The number is still increasing and would have been still greater had deliveries been better and purchase tax less onerous.

A somewhat similar report comes to hand from South Africa, where the Johannesburg City Council, having decided on an experimental scheme for the wiring of 614 houses in a council-owned native township, found that within twelve months after the commencement of supply the native householders had acquired the following appliances, all of which were of good quality, two or three of the radio sets being new models costing something of the order of £100 each:—Irons 253, kettles 44, radio receivers 89, radiators 24, hotplates 22, refrigerators 1 and sewing machine motors 1.

Useful data have been made available to show the extent of the use of domestic appliances in Canada, where 40 per cent of the population lives in rural areas.

Table I.—Statistics from Scotland (Skye and Lochalsh)

Year	No. of consumers connected	kWh generated		Max. demand		kWh per consumer	Domestic consumers cooking by electricity. Per cent	Lines in service, miles
		Water power	Diesel power	Total kW	Per consumer			
1950	1,233	2,636,520	75,833	810	0·665	2,174	39·85	121
1951	1,715	3,044,000	323,000	1,200	0·700	2,005	43·40	191

The figures in Table II show the use of appliances for each 100 households in the territory concerned. The "saturation" percentage figures show there is still a wide market for appliances, particularly in the farmyards where the use of power appliances has lagged behind their use in the farm homes.

The Central Electricity Board of the Federation of Malaya in its first annual report stated that it had on hire 935 cookers, 1,330 water heaters, 5,685 ceiling fans, 368 table fans, 193 refrigerators and 298 motors totalling 10,269 h.p.

In rural areas in Western Ireland the average consumption per consumer rose from 500 kWh in the first year to 700 kWh in the second year, the most favoured appliance in the dwelling house being the electric iron, next in preference the electric kettle, radio set and cooker. In 1950 the sale of appliances to consumers in the Republic continued to increase, the value of sales at £300,472 being £55,000 greater than in the preceding year.

In India, in the area of Madras served by the Pykara and Mettur hydro-electric schemes, in the Punjab where the Uhl river scheme provides power, and in the areas served by the Ganges grid, the story is the same with a demand for fans, small agricultural pumps, sugar-cane crushers, flour and rice mills, power looms, ice making plants and small appliances increasing in popularity.

Cottage industries play a surprisingly large part in Indian industrial production and the development in these industries is being actively encouraged by the various State Governments. The Federation of Industrial Co-operative Societies has been formed to help to develop cottage industries by bulk buying and selling, by the provision of modern samples and designs, by the furnishing of technical assistance to improve designs and manufacturing processes and by the supply of modern tools and implements. There can be little doubt that as power supplies reach the villages the

Table II.—Appliances in Canada (per 100 households)

Province	Radio sets	Vacuum cleaners	Washing machines
Prince Edward Island ..	90	17	43
Nova Scotia	91	28	65
New Brunswick ..	89	26	66
Quebec	93	33	75
Ontario	93	55	79
Manitoba	90	41	70
Saskatchewan	92	26	68
Alberta	92	37	71
British Columbia ..	90	50	70

(1) Standard straight-line intermediate suspension tower in low country in Ceylon

(2) Installation of tower foundation in India

Method of distribution employing low voltage circuits strung below 11 kV line on the same wood poles (Uganda Electricity Board)

demand for small tools and appliances will grow apace.

Rural electrification has made rapid strides in Australia since the war, partly because of the subsidies which are paid towards the cost of power lines to outlying farms and partly because of the high post-war prices of primary products, notably wool, meat and fruit, which have brought prosperity to Australia's farmers.

A recent survey, included in the presidential address by Mr. V. J. F. Brain to the Institution of Engineers of Australia, shows that 31 per cent of the 232,000 farms in Australia now have supplies of electricity. The spread of electrification in the more closely settled States of the east has, in the last year or two, been limited only by the shortage of materials. Every new farm consumer means that another homestead is in the market for domestic appliances, while pumps, grinders and other machines are sure to be in demand for use on the farm, more particularly as farm labour is scarce and wage rates have spiralled upward for some long time.

The outstanding figures for appliance sales in rural areas are probably realized in the Tennessee Valley, U.S.A., where with the encouragement given to rural electrification by loans made available to Rural Consumers' Co-operative Societies by the Rural Electrification Administration, farmhouse electrification grew from 3 per cent in 1933 to 16 per cent in 1940, 28 per cent in 1945 and 82 per cent in 1950. Some 80 per cent of the houses have refrigerators, 40 per cent cooking ranges and 25 per cent water heaters, while 35,000 houses are heated exclusively by electricity and the use of portable heaters has become widespread. This has led to the growth of farm uses of electricity from an average of 600 kWh to 2,000 kWh a year. It has been estimated that dealers in the T.V.A. area in 1950 sold electrical appliances of a retail value of well over $100 million.

This survey shows that in the wake of the electricity supply line there follows an ever-increasing demand for house-wiring cables and equipment and domestic and power appliances. The resolution that a licence to export should be granted only when the price per ton exceeds some figure based on the man-hours spent on fabrication may, therefore, reflect an insufficient appreciation of the ultimate value of an overseas overhead line contract. Account should be taken of the follow-on trade in appliances with a consequent flow of foreign currency towards this country which must result from the export of the basic materials.

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Profit from Trolley-buses

DURING the past financial year the South Shields Corporation's trolley-bus system earned a surplus of £1,025. There was a loss of £15,659 on the motor-bus undertaking, however, making a net deficit of £14,634 for the undertaking as a whole. At the end of the year there were 61 trolley-buses in use. They carried more than 31½ million passengers.

Gold Coast Project

Power Development for Aluminium Production

ALUMINIUM consumption in Great Britain in 1951 amounted to 316,000 tons and it is estimated that requirements will increase at an average annual rate of 5 per cent. At present more than four-fifths of the supply of virgin aluminium is derived from "dollar" sources and it is with a view to producing a greater proportion of future needs from the sterling area that the Volta River scheme in the Gold Coast has been propounded.

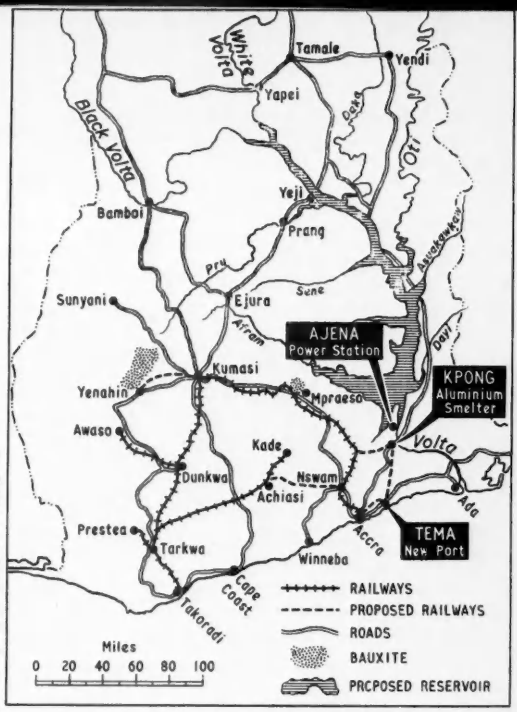
Last week a White Paper was issued ("Volta River Aluminium Scheme," Cmd. 8702, H.M. Stationery Office, 9d) setting out the proposals for developing the power of the Volta River and using it for the treatment of the bauxite deposits of the Gold Coast.

The possibilities of the Volta River as a source of hydro-electric power have long been recognized but the heavy capital expenditure involved could only be justified by the existence of adequate industrial uses of the power. The comparative proximity of bauxite deposits makes the erection of an aluminium smelting plant possible.

There had been investigations into the development of the Volta River before 1949 but in that year Sir William Halcrow and Partners were asked to report on the subject and they submitted a favourable report two years later. A favourable view was also taken by a joint mission of Aluminium, Ltd., and the British Aluminium Co.

It became clear that substantial Government participation would be essential if the project was to be proceeded with.

Exploratory discussions took place in London last year between representatives



Map indicating the developments set out in the White Paper

of the United Kingdom Government, the Gold Coast Government and the two companies mentioned and although they could not commit their principals those who took part agreed upon the technical and economic feasibility of the project.

Broadly the scheme envisaged falls into three parts. The first is the construction of a power station at Ajena, about 70 miles from the mouth of the Volta River (see map), involving the creation of a reservoir with an area of 2,000 sq miles. The station would ultimately have a continuous generating capacity of 564,000 kW and would cost £54 million. The cost of the first stage would be £45·5 million and power would become available in from five to seven years after work began. By far the greater part of the power would be required for aluminium production (initially 80,000 tons and ultimately 210,000 tons a year) but a margin would be available for other consumers—about 50,000 kW.

An aluminium smelter would be set up in the vicinity of Kpong, about 12 miles from the dam, and this would draw

bauxite from deposits at Mpraeso and Yenahin which are estimated to exceed 200 million tons, sufficient to keep the smelter at maximum output for 200 years. A new port is to be constructed at Tema irrespective of whether the scheme as a whole is undertaken.

It is proposed that the power scheme should be financed jointly by the United Kingdom Government (up to £46 million) and the Gold Coast Government (up to £8 million). The bulk of the cost of the aluminium smelter (£64 million) would be met by the aluminium companies and private investors with participation by the United Kingdom and Gold Coast Governments. The latter would finance the port, rail, road and other public works up to a total of £26 million.

A Volta River Authority would be set up by the Gold Coast Government. This authority would be responsible for the co-ordination of all planning and construction work arising out of the scheme, including the building of the dam and power station, substations and transmission lines; the aluminium smelter and alumina works; port and railway facilities; roads; and townships.

There would also be a Volta Electricity Board which would take over from the Volta River Authority all responsibility in respect of the dam and power undertaking when the construction work was completed and the first power had become available. Thereafter it would also be responsible for the maintenance and repair of the plant and for the provision of further generating units, transmission lines and other extensions. It would also take over power sales agreements from the Authority and undertake new power contracts. The chairman would be a whole-time officer appointed by the Gold Coast Government and the Board would be representative of the Volta River Authority, the Gold Coast Government and prominent persons in the territory, the British Government (one nominee) and the aluminium interests (one member).

At discussions between the two Governments and the aluminium interests in June last it was agreed to establish a preparatory Commission to undertake the preliminary work.

In the White Paper the Government says that it believes the scheme to be soundly conceived but its magnitude is such that it should not be embarked upon without every practicable assurance that it can be carried through to a successful conclusion. It is for this reason that the Preparatory Commission should be set up at once and it will be asked to report with all practicable speed. A supplementary estimate covering the cost of the Commission to the Exchequer in 1952–53 will be submitted to Parliament in due course.

Sulphur in Flue Gases

AT a meeting of the Institute of Fuel to be held at the Royal Society of Arts, London, on 17th December, three papers will be read which will deal with the sulphur content of the flue gases discharged from power station chimneys.

In the first paper Mr. R. Llewellyn Rees (chief chemist, British Electricity Authority) points out that washing opposes the good effect of a tall chimney by cooling the gas and may actually increase local pollution in certain states of weather. Furthermore, washing processes are wasteful in that no useful material is recovered from the flue gas. The use of gas liquor for manufacturing ammonium sulphate from flue gas may, however, provide a limited solution to the problem where stations are so sited that cooling the gas is not objectionable, even when the fuel is rich in sulphur.

A second paper, by Messrs. S. R. Craxford, A. Poll and W. J. S. Walker, of the Fuel Research Station, describes a small plant, built at the Station, which has successfully treated 1,000 cu ft/hr of flue gas from a Lancashire boiler, using the ammonia process of sulphur recovery developed before the war by Simon-Carves and the Fulham Corporation. This plant removes 99 per cent of the sulphur dioxide and produces ammonium sulphate from the scrubber liquor by a modification of the German Katasulf process.

In a third paper Mr. S. H. Richards describes a survey, by the Fuel Research Station, of the concentration of sulphur dioxide (estimated by the lead peroxide method) in the air of south-west London with a view to studying the effects of flue gas washing at Fulham and Battersea power stations.

PUSH-BUTTON SIGNALLING

New London Transport Installation at Ealing Broadway

WHEN we visited Ealing Broadway last week we saw the push-button control desk in the new London Transport signal cabin from which the whole of the signalling for the District and Central Line terminal stations is controlled. The desk has forty-three buttons and when one of them is pressed the points and signals for a particular route are operated. The buttons are self-restoring so that the complete operation of signalling a train through a route is achieved by pressing the button once only.

A system of pre-selection allows the signalman to press the button for another train movement after he has cleared the signals for a previous movement. When the first train has passed through its route the points are operated for the second route and the signals cleared without any further effort on the part of the signalman.

The push-buttons are made of "Perspex" and the coloured lights mounted below them cause them to act as indicators. When a route is at danger the buttons are red and when a button is pressed to select a route it is yellow. When a route is set and the signals cleared the button is green and remains so until the signals have been replaced to danger by the passage of a train, when the button reverts to red.

A signal which has been cleared by pressing a button may be replaced to danger by pulling the same button. Similarly a button which has been pressed and has changed to yellow, indicating that a route has been pre-selected, may be pulled to cancel the operation.

The desk is so designed that when the signalman is seated in front of it he has all controls within easy reach. A telephone control panel is on the left-hand side of the desk and the equipment includes a microphone and loudspeaker; instrument indications and push-buttons for the control of train indicators are on the right-hand side. An illuminated diagram behind the control desk indicates the condition of all the track circuits, signals and points in the area.

The signals and points are operated from the push-buttons by the remote control air-operated lever system, the set of levers in this case being on the ground floor of the new signal cabin. Relays of wiring of the telephone type are used for the link between the push-buttons and the air-operated levers. Provision has been made for automatically signalling Central Line trains in and out of the terminal station if required.

The installation includes two-aspect colour light signals with junction indicators for diverging movements, train stops at all signals used by passenger trains, condenser feed track circuits and electro-pneumatically operated points. About 200 miles of wire with 25,000 terminations have been used in the installation.

The whole of the work has been carried out by the staff of London Transport under the chief engineer, Mr. P. Croom-Johnson, C.B.E. The system was devised by Mr. R. Dell, signal engineer, and was designed and installed by his staff. The control desk and signalling equipment were made by the Westinghouse Brake & Signal Co., Ltd.

The control desk and illuminated track diagram in the new London Transport signal cabin

The Fuel Situation

Use of Electricity in its Correct Perspective

TO help those who are perplexed and bewildered by the recent spate of criticism of the use of electricity for certain purposes, particularly heating and cooking, the Electrical Association for Women held a conference on "The Fuel Situation" at the Institution of Electrical Engineers last week. Presiding over the nearly 600 persons present from all over the country Dame Caroline Haslett, director of the E.A.W., said that everyone was aware that the fuel situation was difficult but women had come to appreciate electricity as a means for conserving energy and wanted to know whether, in view of conflicting statements, it was right for them to use electricity. Accordingly the Association had asked experts to come and help put the matter in its correct perspective.

Domestic Development

Speaking on "Electricity in Domestic Economy and in the National Economy," Mr. R. Y. Sanders, deputy commercial manager and chairman, Utilization Research Committee, British Electricity Authority, said that in the past thirty years sales of electricity had increased from under 4,000 million kWh to 30,400 million kWh a year, while the number of domestic consumers had risen from just over 500,000 to about 12 million out of 14½ million households. By 1951 about one-seventh of domestic consumers were using some form of electric water heater, about one-fifth were cooking by electricity, and no less than two-thirds were using electricity for "comfort heating," a term more descriptive of what electricity did than "house warming" or "space heating," which were more descriptive of what the older methods really did.

Development had reached the stage where electricity was a virtual necessity for lighting in the vast majority of homes and where there was a striking rate of increased preference for its use to provide the main household requirements of cooking, water heating and comfort heating, to say nothing of its value in various subsidiary household chores, and for the radio and television services. Since the war there had been a speeding up in development but shortages of labour and materials, and other restrictions, had limited the possibilities, and for the last four years only about 400,000 new consumers a year had been added compared with over 700,000 before the war. A variety of factors, social and economic (not the least being the shortage, poor quality and high price of solid fuel), had encouraged a large increase in the use of electricity by existing consumers, the average consumption per consumer increasing from just over 600 kWh in 1938 to more than 1,300 kWh in 1951. Such a striking development did mark a significant change in the fuel-using habits of British households, on a scale which was bound to cause concern to the older established methods of supplying household requirements for heat.

Housewives Perplexed

The housewife's bewilderment in this matter of fuel policy arose because she was being exhorted from all sorts of quarters to use or refrain from using certain appliances or certain fuels on grounds that they were economical or extravagant in coal. Certainly there was no such clear-cut balance of national advantage arising from the housewife's use of any particular fuel and one of the underlying principles which emerged from the recent Ridley Report on National Fuel Policy was the preservation of freedom of choice. To suggest that compulsion must or should be applied to the housewife to secure any pattern of consumption desired by the planners completely underrated the intelligence which most British housewives brought to bear on the problems of running their homes. It was surely time that politicians and professional planners had more confidence in the good sense of the average British housewife.

With regard to comfort heating, if the sole consideration was the amount of coal

used, without regard to labour-saving, amenities, etc., it was probably true that where the need was for long-period heating, less coal was used when burnt as solid fuel in a modern appliance than was required to supply gas or electric fires; on the other hand, less coal was used for an electric fire when only comparatively short period heating was needed, and in this country a large proportion of heating requirements was intermittent.

A recent Government sampling inquiry disclosed that some 92 per cent of households used a coal fire in their main living room. Investigations showed that the average consumption per year of an electric fire was so small that it could hardly be in use for more than two or three hours at a time. The outcry that had been raised against the use of electric fires on the score of coal conservation was therefore quite unjustified.

Where solid fuel was advantageous because continuous comfort heating was required it would usually be found more economical to heat water from the same source. This was, of course, the common practice, but the housewife was fast realizing that to run a solid fuel system during the summer merely to provide hot water was both uneconomical and uncomfortable and she was adopting the immersion heater to provide summer hot water. This was clearly a good move from the national point of view and provided further evidence that the housewife could be trusted to do what was best if given proper guidance.

A Cooking Fallacy

For a politician to say in the House of Commons that cooking by electricity required 2½ times the coal that gas did was just arrant and ridiculous nonsense. Indeed, said Mr. Sanders, if all the electric cookers were replaced by gas, more coal would be needed overall than was now taken, whereas if all the gas cookers were replaced by electric ones then the total coal quantity would go down. However, such a transfer of load from gas to electricity would be quite impracticable and undesirable at present; the nation could not afford the extra capital, materials and labour, the electricity supply industry had not the plant, and if the output of gas were reduced the nation would lose coke and the other derivatives.

From the aspect of national economy Mr. Sanders said that the American worker had at his disposal three times the power available to the British worker, and unless means could be found to keep pace with the extraordinarily rapid development in the use of power then our chances of survival as a first-rate industrial power were slender indeed. The only way in which our standard of living could be maintained was by a very great increase in productivity, which meant more use of electricity.

Mr. R. Y. Sanders

Lady Railing

Importance of Diversity

No one seemed to question the need for using electricity for household lighting, motive power, radio and television. With these services becoming a virtual necessity only marginal or incremental capital was needed to supply cooking, water heating and comfort heating. The diversity of load provided by using electricity for domestic purposes enabled the capital equipment employed to be in full use for a greater proportion of hours in the year. We certainly had a lesser relative peak load problem than before the war and were better off in that respect than most other public services, all of which had the same problem. The critics forgot that without the complementary domestic load the cost of power to industry would be materially higher.

Electricity was a good investment, and in spite of the recent price increases necessitated by rising costs electricity remained one of the cheapest things in the post-war world. It was not the capital cost of electricity supply which was preventing a more rapid development of domestic electrification; the main deterring factor was the high cost of domestic appliances, inflated by purchase tax. What possible justification could there be, for instance, for charging a very much higher rate of purchase tax on

an electric water heater than on a gas water heater?

When considering coal consumption, the whole chain of production, distribution and utilization must be taken together. For heating in the home, electricity properly used in an electric fire, for instance, was 100 per cent efficient, whereas the most that the gas industry claimed was about 45 per cent, while an ordinary coal grate usefully employed only about a sixth of the heat in the coal.

In spite of the war, the efficiency with which the power stations used coal was being rapidly improved and in a few years the useful energy reaching the consumer would be not a fifth but a quarter of the energy in the original coal. None of the other major ways of providing the nation's household requirements of heat and power could look forward to anything like as rapid a rate of improvement. These calculations of relative efficiency also overlooked the very low quality of the coal used by the power stations and the incidental use of coal made necessary by the main use, e.g., for the transport of solid fuel, for producing the materials needed for the extra building maintenance and cleaning which was necessary as a result of the burning of that coal and ash disposal. Far too little credit was given to the electricity supply industry for its part in elimination of atmospheric pollution, sickness and disease and no account was taken of the housewife's time.

The evidence given to the Ridley Committee showed that other fuel industries would seek to curtail compulsorily the housewife's choice of fuel she used. The electricity supply industry made no such arrogant claim. All that it asked was the free opportunity, without restriction, to serve the housewife as fully, but only as fully, as she wished.

Some views of a housewife architect on "Heat, Light and Power in the Home" were given by Lady Railing, who emphasized the importance of saving fuel of all kinds by better heat insulation of houses. With regard to the electric fire, she said that for up to six or eight hours' continuous heating it consumed less fuel than even the closable stove. Therefore for the householder who was out most of the day, electricity would economize, not only in labour and cost but also in fuel consumption. This applied not only to heating but also to the hot water supply.

If the housewife went out to work she must have labour-saving equipment to lighten her domestic work when she returned home. If she stayed at home, she wanted it just the same in order to do her work efficiently and without undue physical strain. The use of electricity meant a cleaner home, better health conditions, saving on decorations and house cleaning—all with a saving in physical effort.

Other speakers stressed the saving of fuel resulting from lagging hot water tanks.

Engineers' Guild

ADDRESSING the Southern Branch of the Engineers' Guild in Chichester last week, Mr. Robert Chalmers (president) recalled the reasons for the foundation of the Guild some 14 years ago, and reviewed its activities up to the present time. Membership of the Guild was, he said, restricted to members of the three senior Institutions, namely the Institutions of Civil, Mechanical and Electrical Engineers. The Guild's aim "to promote and maintain the unity, public usefulness, honour and interests of the engineering profession," implied that the status of engineers should take precedence over remuneration.

Among the numerous activities mentioned were: submission of evidence to the Tucker Committee concerning income tax in connection with contributions to superannuation funds; representations to the Home Office to recognize professional engineers as professional witnesses when paying witnesses' allowances, instead of as ordinary witnesses; other representations to the Treasury to secure more favourable applicants' expenses; and the collection of data about prevailing salary ranges.

The question whether the Guild should persuade employers to require continued membership of the appropriate Institution as a condition of continued employment was still unresolved. This proposal, said Mr. Chalmers, had been strongly opposed as an infringement of liberty to resign from membership of an Institution because of possible serious disagreement with Institution policy. The proposal seemed to its opponents to be akin to inviting employers to enforce a "closed shop."

Engineering in Europe

Survey of Current Literature

TUBULAR strut constructions instead of the older trellis-type masts built of structural angles or channels have a number of advantages, among which the greater buckling strength of the tubular strut is prominent, especially as it is further increased by a concrete filling of the struts. The same applies to bending strength.

These factors result in a much more economic design of the mast, reduced areas exposed to wind attack, saving of weight and of cost of foundations. Even æsthetically the strut-type tower is more satisfactory and merges more organically into the landscape. It must be stated that the concrete filling of the tubes is not a mere improvement of the tubular construction, but a necessity owing to the impossibility of welding the tubes in a way to make the welds impenetrable to moisture and safe from frost attack. A number of 110, 220 and 380 kV lines in Germany and Switzerland are at present being erected on towers of this modern design (see *Electrical Review*, 13th May, 1949, p. 825) and calculations show that the primary costs are slightly below those of lines supported on the older tower type.—"The Present State of the Art of Constructing Overhead-Line Towers Built up of Tubular Struts," H. Mors, *E.T.Z.(A)*, Vol. 73, No. 18, pp. 593–597, 11th September, 1952, in German.

Single-core Cable Advantages

The use of three single-core cables for three-phase transmission has hitherto been customary only at voltages above 30 kV and, in special cases, at 6 and 10 kV. However, single-core cables have so many advantages over the three-core type that their use at other voltages than those mentioned is now spreading. The advantages are: greater lengths of cable runs (750 as against 250 m), thus fewer cable boxes, greater current-loading capacity, more short-circuit safety, convenience of erection and better flexibility, as well as simplified maintenance and repair.

On the economic side there are, furthermore, shorter delivery terms and lower price and the fact that a fourth single-core cable may be kept in reserve (instead of a three-core cable) and even buried beside the three in operation for instantaneous replacement of a damaged phase. The disadvantages sometimes attributed to single-core cables in three-phase operation, such as interference with communication lines, the fact that the type referred to is unarmoured, and the greater space requirement, may all be countered by simple and cheap measures, and thus cannot be regarded as a serious argument against the desirable use of single-core cables.—"Single-Core Cables instead of Separately Screened Three-Core Cables," E. Dorfel, *Deutsche Elektrotechnik*, Vol. 6, No. 8, pp. 376–379, August, 1952, in German.

Static Charges on Turbines

The electrostatic charging effect of steam brushing an insulated surface was discovered by Armstrong in 1840 and Faraday found later that the phenomenon occurred only with wet steam. An unexpected consequence of the effect was observed on a two-stage steam turbine erected in 1939; the worm gears of its oil pumps were within a few months of service so badly worn that they had to be replaced.

After a repetition of the occurrence the rotor voltage was measured by voltmeter and, since no reliable reading could be obtained, by cathode-ray oscillograph. A kind of saw-tooth voltage pulse appeared on the screen, but it was rarely quite regular because the charge and discharge were influenced by too many uncontrollable factors. At any rate, the explanation of the singular phenomenon was now clear, viz. that the rotor was charged up to about 110 V at the outlet side of the high-pressure stage by the wet steam, this voltage being

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates. —Editors, *Electrical Review*.

high enough for a thin oil film to be punctured whereby the voltage on the rotor fell to zero and a new charging cycle could begin. The worm-gear of the oil pump drive was directly coupled with the rotor and the thinnest oil film, the one punctured, was between worm-gear and worm. Each puncture removed a crystal from the bronze wormwheel so that the high repetition rate of the process could not but result in rapidly progressing pitting.

It is a rare example of pure spark-erosion. The remedy is simple and effective; it consists in earthing the rotor through a brush pressed against the shaft.—" Electrostatic Charge on Steam Turbine Rotors," K. J. Koikens, *Electrotechnick*, Vol. 30, No. 16, pp. 282–283, 31st July, 1952, in Dutch.

Swiss Air-blast Breakers

The article deals briefly with the basic design principles of modern, simplified and quick-acting air-blast circuit-breakers and then describes at some length the new h.v. Brown-Boveri breakers which are designed for operation under extreme climatic conditions and use the well-tried principle of potential-controlled multiple breaks. They are particularly suitable for single-phase and three-phase rapid reclosing and are tested for voltages up to 380 kV. This type is contrasted with the equivalent models of American, British, Swedish and Russian makes the characteristic details of which are shown in diagrams and photographs. The part of the article devoted to German production deals with new breakers of the firms "Karl Liebknecht," A.E.G., Siemens-Schuckert and Voigt & Haeffner, which include gas-blast, expansion and free-jet types up to 400 kV and 4,000 MVA. The last section deals with the differences between testing practices in various countries.—" The Development of H.V. Circuit-Breakers in Germany and Abroad," I. Bernhard, *Deutsche Elektrotechnik*, Vol. 6, No. 7, pp. 316–321, July, 1952, in German.

Control of Interconnected Systems

Favourable solutions of the problems of the control of frequency and of exchanged power may be obtained by consideration of the natural characteristics of the interconnected systems. For a very small system interconnected with a very powerful one it is only necessary to regulate for constant power exchange on the side of the small system, independently of frequency control in the large system.

Where systems of comparable size are interconnected, satisfactory regulation of the frequency and the power interchange must be based on a frequency-power relation derived from the system characteristics. This leads to the conclusions that load variations should always be regulated inside the system in which they occur and that any derivation from the rated frequency is compensated for by power exchange between the systems corresponding to their relative sizes and to the amount of the frequency deviation, and in the required direction.

The system regulators carrying out this control must be quick-acting in order to prevent the turbine governors from operating before the need arises and also to prevent overloading of the coupling lines. Much depends in this respect on the speed of response of the communications channel used for telemetering between coupling station and regulating power station, it being also required that the system regulator itself should be able to influence the turbine governor of the regulating power station directly when needed.—" Power and Frequency Control in Interconnected Systems," H. Bocker, *Elektrizitatswirtschaft*, Vol. 51, No. 15/16, pp. 406–412, August, 1952, in German.

Crystal Rectifiers

THE use of crystal rectifiers and amplifiers as " tools " in industry was the subject of a lecture delivered by Dr. E. G. James to the annual joint meeting of the Association of Supervising Electrical Engineers and Institution of Engineers-in-Charge held recently in London.

Crystal rectifiers and amplifiers were shown to be devices which made practical use of the peculiar electrical properties of the class of substances known as semi-conductors. The first part of the lecture explained how these properties came about and indicated which substances could be expected to possess them.

The lecturer then proceeded to demonstrate the operation of these devices, drawing particular attention to the characteristics of point contact germanium rectifiers, the effect of shock on such rectifiers, the characteristics of germanium photo diodes, the employment of the latter for switching purposes and the use of germanium triodes for amplification, oscillation and switching.

Electric Cranes

Controlled Acceleration and Creep Speed Systems

TWO new control schemes for electrically operated cranes have recently been developed by De Renzi Holmes & Co., Ltd., one of them being known as the "Auto-Cam-Tactor" system of controlled acceleration and the other the "Hilotrol" creep speed scheme for the control of a.c. hoisting motors.

The former is designed to give cam operated contactor controllers the same advantages in automatic acceleration as are enjoyed by magnetic contactor panels, the system being applicable to both a.c. and d.c. machines. It consists in providing a series wound hold-on coil for each accelerated contactor with which is combined a series wound sequence coil. An interesting feature is that no additional moving parts are added to the controller, the control coils are all series wound and no auxiliary switches are required. The controller incorporating this scheme can be treated as if it were the master controller of a magnetic contactor equipment. The handle can be moved, without pausing, to any notch and can even be moved quickly from full speed forward to full speed reverse without producing unduly high current peaks.

Fig. 1 shows the hold-out coil H and sequence coil S applied to contactor A to which is added the armature B. The contacts E are inside the arc chute C and are closed with the cam D in the position shown. When the camshaft is turned clockwise the contacts open and the armature approaches the pole piece of the hold-out magnet. Here it is attracted to and held by the pole piece as soon as current flows in the series coil. The controller handle can then be turned to close the contactor but the circuit is not made until the current flowing in the magnet coil is reduced to a set value and the armature released.

In Fig. 2 the "Auto-Cam-Tactor" is applied to a series wound motor and plain series controller. Contactors 5, 6 and 7 only are controlled because the initial current passed by the starting resistance is not sufficient to warrant controlling contactor 8. If the handle is moved slowly, allowing the current peaks to die down to normal between notches, the controller behaves in the ordinary way, but not if it is moved instantly from off to the full speed position. In the latter case when the controller reaches the first notch contactors 1 and 4 (or 2 and 3) close and current flows from positive through the armature, blow-out, hold-out and sequence coils, starting resistance,

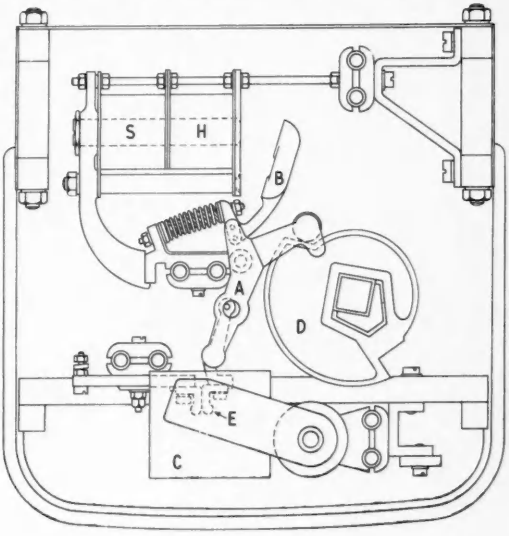


Fig. 1.—General arrangement of "Auto-Cam-Tactor" controller

brake, series field and contactor 9 back to negative. This current may be less than full load but each "Auto-Cam-Tactor" has both hold-out and sequence coils energized, these providing the ampere-turns necessary to hold out the contactor against the pressure of the closing springs. Contactor 8 is not controlled so it closes as the handle passes the second notch and cuts out the section of resistance which produces a current peak and also cuts out the sequence coil 7. Owing to this current peak contactor 7 does not immediately close and as the handle is moved through the remaining notches contactors 6 and 5 are held out even with a small current flowing because both hold-out sequence coils are in circuit.

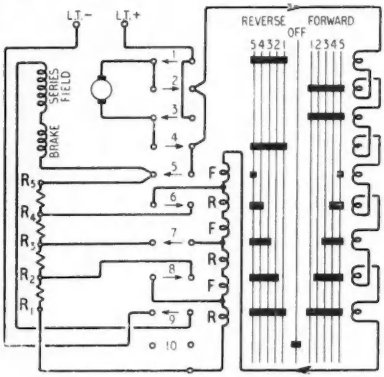


Fig. 2.—Diagram of connections of reversing cam operated controller for a d.c. motor

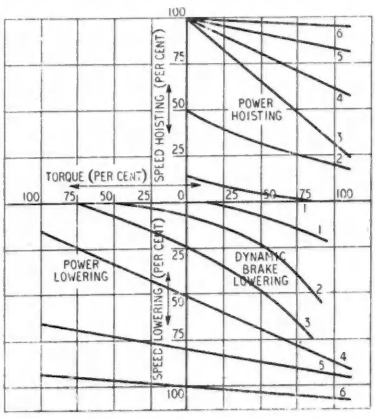


Fig. 3.—Torque-speed curves for "Hilotrol" creep speed hoist motion for a.c. operated cranes

When the current peak has died down to about 10 per cent above full load current contactor 7 closes and cuts out resistances R2–R3 and sequence coil 6. A peak current is again produced and when this has died down to the setting value contactor 6 closes. The same action again takes place until contactor 5 closes, putting the armature across the line and bringing the motor up to full speed.

If the operator now swings the controller straight through to full speed in the opposite direction the following action takes place. As the controller is returned to the opposite position the resistance and line contactors are mechanically opened by the cams, and as it passes over to the reverse direction the line contactors and contactor 8 close, giving rise to a current peak determined by resistance R2–R5 and the back e.m.f. of the motor added to the line voltage contactors 7, 6 and 5 are controlled as previously described and the motor is first brought to a standstill and then accelerated steadily to full speed in the opposite direction.

The use of this scheme of control in many cases renders the hand-operated cam controller the equivalent of the more expensive magnetic contactor equipment.

In the case of the "Hilotrol" creep speed scheme the hoist motion is driven by two ordinary slipring induction motors having a total h.p. about 125 per cent of that required to hoist full load at the required speed. Both machines are permanently geared to the hoisting drum and therefore always run at the same speed. One motor is always used as an ordinary slipring machine with its speed controlled by rotor resistance. The other one can be made to act as a brake by supplying d.c. to its stator, or it can act as a motor in the ordinary way. Both machines are controlled by an ordinary controller which has additional contacts for handling the d.c. for braking. The switching sequence can best be understood from the torque-speed curves in Fig. 3.

The advantage of this system of driving hoisting motions is that whether the load is light or heavy it is under full control from the controller handles on all notches, hoisting and lowering, and good torque is always available to bring the motor to the required speed.

NEW BOOKS

Direct Current Machines. By H. B. Ranson. Pp. 285; figs. 157; index. Cleaver-Hume Press, Ltd., 42a, South Audley Street, London, W.1. Price 10s 6d.

The scope of this book is the theory, construction and use of d.c. generators, motors, together with starting and speed control gear. In addition to describing the construction and basic principles this volume differs somewhat from the ordinary text-book in the amount of included information which is of use to engineers and electricians in their work of installation and maintenance. Such readers will no doubt be interested in the notes on such matters as the properties of insulating materials, safe temperature limits, and especially in the last chapter which deals with enclosures, ratings and choice of motors.

The book is also intended to serve the needs of students who are taking the intermediate City and Guilds examination in Electrical Engineering Practice, and explains the basic principles involved in the design of the apparatus without delving into such finer details as might be required by a designer.

The author has dealt with his subject in a lucid and interesting manner which should be easily understood by any reader having an elementary knowledge of electricity. A number of test questions have been set to enable the student to test his grasp of the subject, answers being given to the numerical questions. This is a very readable and useful book.—J.L.W.

The Resonant Cavity Magnetron. By R. S. H. Boulding. Pp. 147; figs. 80; index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 21s.

This book is addressed to those engaged in the study, manufacture, servicing or operation of radar equipment. It is a qualitative account of magnetron operation using only rudimentary theoretical apparatus. The book starts with an account of the limitations of triode oscillators, an outline of basic electronics and the motion of electrons in crossed electric and magnetic fields. Early types of magnetron are then described. The main body of the book deals with the resonant cavity magnetron, giving a qualitative derivation of the threshold conditions, the power output and efficiency. Modulators and output coupling are discussed as are frequency pulling and block setting. Chapters on cathodes, construction of magnetrons, continuous-wave magnetrons and commercially available magnetrons complete the book.

It is clear from the book that the author is more at home when discussing the circuit behaviour and applications of magnetrons than in describing their electronic operation, design or manufacture. There are some grave mis-statements of fact which make one unduly critical of the rest of the book, e.g. we are told that the order of magnitude of the upper frequency limit of triode oscillation is 500 Mc/s; 5,000 Mc/s would have been nearer the mark. In the section on cathodes, the author implies that the limiting thermionic emission from an oxide cathode is about 100 mA/cm² and that the observed large current densities in magnetrons are due to secondary emission. In fact oxide cathodes give pulsed emissions of up to 100 A/cm² in conditions where secondary emission is impossible. Numerous examples of this kind could be quoted.

While there is no doubt that this book would give radar service and maintenance personnel a fairly adequate picture of the most important features of magnetron behaviour, a treatment at this level is not useful for students and engineers interested in the detailed behaviour of modern magnetrons.—A.H.B.

Books Received

Electric Welding, Heating and Electro-Plating. Edited by E. Molloy. Pp. 148; figs. and index. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 17s 6d.

Electric Traction, Lifting and Conveying. Edited by E. Molloy. Pp. 164; figs. and index. George Newnes, Ltd. Price 17s 6d.

Thermionic Vacuum Tubes. By W. H. Aldous and Sir Edward Appleton. 6th Edition. Pp. 160; figs. 98; index. Methuen & Co., Ltd., 36, Essex Street, London, W.C.2.

Die Messwandler. By Dr. J. Goldstein. Pp. 212; figs. 199. Verlag Birkhauser, Basle.

Thermionic Emitters

AT an I.E.E. Radio Section meeting on 3rd December, Mr. D. A. Wright (G.E.C. Research Laboratories) presented an "integrating" paper surveying the present knowledge of thermionic emitters. He explains that a thermionic emitter is, in general, useful only if it maintains some required emission level over a long period of operation. Judged in this way, the most satisfactory clean metals are tungsten, tantalum, hafnium and rhenium. Tungsten gives 250 mA/cm² at 2,500 deg K for some tens of thousands of hours, and the other metals are expected to behave in similar fashion.

Thoriated tungsten at 1,900–2,000 deg K can be operated at about 1 A/cm² to give a similar long life if the vacuum conditions are good. Barium and caesium adsorbed-layer cathodes lose active material rapidly at emitting temperatures, and can be used only if a replacement mechanism is provided. This is done with barium with the Lemmens cathode, and with caesium in caesium-vapour tubes.

The borides of the alkaline and rare-earth metals give good emission, especially lanthanum boride. Life tests under practical conditions have not yet been carried out, but experiments indicate that emission of 2–3 A/cm² should be available at 1,780 deg K for tens of thousands of hours. Thorium carbide is also of interest, giving similar emission at 1,950 deg K; the life is not yet established.

The barium strontium-calcium-oxide type of emitter operated at 1,000–1,100 deg K will give very long life under good vacuum conditions at current densities up to some tens of mA/cm² in continuous operation. The life falls below that to be expected from evaporation data when the current density rises to hundreds of mA/cm² and present experience is that the life falls below 1,000 hr before 1 A/cm² is reached. In pulsed operation much higher peak currents can be drawn. The reduced life at high current density is due to a combination of electrolysis and "poisoning". No means have yet been discovered for improving this situation under practical conditions.

With thoria the emission is similar to that of thoriated tungsten, and the evaporation data would predict long life at 1,900–2,000 deg K, but again the life falls as current density rises. With coatings of a practicable thickness, present experience is that for lives exceeding 1,000 hours the current density cannot exceed 1 A/cm². Somewhat better performance can be obtained for sintered mixtures of thoria with molybdenum or tungsten.

Work-Hardening of Metals

IN the thirty-ninth Thomas Hawksley Lecture (Institution of Mechanical Engineers) Professor N. F. Mott discussed the mechanism of work-hardening of metals. He showed that their crystalline structure was marred not only by visible defects (e.g. grain boundaries) but also by vacant lattice sites (due to missing atoms) and by dislocations and slip bands. Dislocations referred to the lines bounding a plane that had slipped through one atomic distance, whereas slip lines in crystals were the result of slip through about one thousand times that distance.

When found at low temperatures, each slip line occurred from displacement of material along a single lattice plane, the steps in the surface appearing as slip bands and attaining their full height in a fraction of a second, though their length might thereafter increase slowly. At higher temperatures and at slow rates of strain, the slip bands appeared under the electron microscope as clusters of lines a hundred atomic distances apart.

The origin of slip lines was in an arrangement of dislocation lines in a crystal interior (Frank-Read sources). Where a slip line terminated, dislocations remained in the crystal, and work-hardening was ascribed to internal strains around them. Vacant lattice lines were found in a cold-worked material. At temperatures high enough to permit of diffusion, they softened the material round the slip band and allowed the formation of clusters; they also helped to produce fragmentation of cold-worked material. The enhanced electric resistances resulting from cold working were caused by these vacancies in the lattice.

VIEWS on the NEWS

By REFLECTOR

FEW of the principal actors at the Coronation of Edward VII can be living now. Those who survive and are present at next year's ceremony will testify to the tremendous advance in electric lighting made in the half-century. In last week's *Spectator* there appeared an article on the 1902 Coronation by the Rev. W. J. Conybeare, who was the Archbishop of Canterbury's chaplain and took an active part in the service. Mr. Conybeare, in the course of his article, says:—

> "It was fine, but sunless, so the Abbey was rather dark until the moment of crowning, when the newly installed electric light was switched on, with welcome brilliance. It was, of course, the first time such light had been used at a Coronation."

* * *

Although to my mind a professional engineer should be a member of an appropriate Institution, the suggestion of some members of the Engineers' Guild that employers be asked to require such membership as a condition of maintenance of employment is surely the wrong way to bring this about. The argument advanced that an engineer who terminates his membership is thereby no longer qualified begs the question. Also the comparison with a solicitor or medical man whose name is removed from the rolls or register is invalid, since non-membership of a technical institution does not usually reflect on professional conduct. I am therefore rather glad to see that the president (Mr. Robert Chalmers) has reported strong opposition among Guild members to this proposal.

* * *

In many people's view the nationalized industries should be subject to some form of general control and where possible their activities should be co-ordinated. I have yet to see, however, any scheme which would not tend to cramp the style of the individual services. Already coal, gas and electricity are under the supervision of the Ministry of Fuel and Power and, with transport, under the super-supervision of Lord Leathers. Now Mr. S. J. L. Hardie, the former chairman of the Iron and Steel Corporation, proposes an "Independent Nationalized Industries Board," to operate as a link between the industries and Parliament. This Board would be responsible for "co-ordination of policy, financial control and general organization." The members would "primarily be industrialists with a wide knowledge of commercial and industrial life, and with specialized knowledge of particular aspects of this life." Later, Mr. Hardie stresses the need for the right kind of people on the boards of the individual nationalized industries. In my view if this were realized the case for the over-riding body would be almost negatived.

* * *

Another correspondent has written about my comments on the American use of "psi" and "psig" as steam-pressure abbreviations. I said that the first had a Greek appearance; my correspondent, Mr. C. J. McNaught, of Broome Park, Betchworth, says he actually suggested the use of the Greek letter psi (ψ) for lb/sq in some years ago in the *Engineer*. He went further in proposing $\psi\alpha$ (psi-alpha) for absolute pressure and $\psi\gamma$ (psi-gamma) for gauge pressure. He says the idea was well received in America so maybe this was the beginning of the practice adopted there.

* * *

In commenting upon "the absurd rivalry" between gas and electricity the *Evening Times* (Glasgow) says that competition between free enterprise is believed to be good for the consumer, but it asks: "Is it still good when it involves two public services under the ægis of one Ministry?" I think that the answer is "Yes" and in this I am doing no more than following the Ridley Committee. In any event, how are the benefits of competition dissipated by a change of ownership?

PERSONAL and SOCIAL

News of Men and Women of the Industry

LAST Tuesday **Mr. J. F. Stanley,** B.Sc. (Eng.), A.C.G.I., M.I.E.E., completed thirty years' service with the British Standards Institution. He joined the Electrical Section of what was then the British Engineering Standards Association in 1922 and although in the course of the years many and varied other duties have fallen upon him the electrical side is still his first consideration as he is assistant technical director, electrical and communications. Mr. Stanley is also secretary of the British National Committee of the International Electrotechnical Commission.

Mr. A. G. Owen has been appointed to the board of the Sun Electrical Co., Ltd. Mr. Owen, who has been with the company since 1906, was for many years assistant manager of the Installation Accessories Department, and in 1945 he became manager of that department. He was appointed a special director, responsible for the installation accessories side of the company's business, in 1950.

Mr. A. G. Owen

To mark his completion of fifty years' service with the Electric Construction Co., Ltd., **Mr. W. M. Furniss,** chairman and managing director, has received a presentation from the workpeople and staff. At his own request this has taken the form of an illuminated double dial clock mounted above the main office entrance, with a plaque below. The presentation was made on 24th November by three employees, each of whom has been with the company for more than fifty years. In formally accepting it, Mr. Furniss started the clock and uncovered the plaque.

Lord Burghley, K.C.M.G., LL.D., chairman of A. C. Cossor, Ltd., was re-elected president of the Federation of Chambers of Commerce of the British Empire at the annual meeting held on 25th November, when he delivered his presidential address. Other retiring honorary officers re-elected were Sir Percy H. Mills, K.B.E., chairman of the Council, Mr. J. R. K. Tyre, deputy-chairman and Mr. C. D. Gill, treasurer.

Mr. R. L. Batley, A.M.I.Mech.E., chief generation engineer (operations) of the Merseyside and North Wales Generation Division, British Electricity Authority, has been appointed controller of the Midlands Division in succession to **Mr. F. W. Lawton,** M.I.E.E., M.I.Mech.E., A.C.T.C., who is to retire at the end of the year.

Mr. Batley studied at Liverpool University, Bradford Technical College and the Regent Street Polytechnic, and, after serving a mechanical engineering apprenticeship at the Cunard Engine Works, became a marine engineer with the Cunard Steam-Ship Co., Ltd. He subsequently held power station appointments at Bradford, Hackney and later at Neasden where he became resident engineer. In 1944 he was appointed generation engineer with the Swansea Corporation, having charge of the management of the Tir John station, and then, in 1947, he became superintendent engineer of generation with the Liverpool Corporation Electric Supply Department. He was appointed to his present position on the establishment of the British Electricity Authority in 1948.

Mr. Lawton, after technical study at Northwich and King's College, Newcastle, began his engineering training with W. E. Bates & Sons, Northwich, and continued at the Heaton Works of C. A. Parsons & Co., Ltd. He then entered municipal service as assistant to the city electrical engineer, Stoke-on-Trent. Soon afterwards he went to Birmingham where he was engaged on power station design.

Mr. R. L Batley

Mr. F. W. Lawton

operating and testing. He subsequently became special technical assistant, chief assistant engineer and, later, deputy chief engineer and manager. He was appointed chief engineer and manager in 1944, which post he held until 1948, when, with the reorganization of the industry, he became controller for the Midlands Division. Mr. Lawton has taken a special interest in power station design and construction and has been responsible for the construction of Hams Hall "A" and "B," Nechells "B" and the new Drakelow "A" power stations.

Mr. V. A. H. Clements, assistant commercial manager, British Electricity Authority, has been nominated as British representative of the UNIPEDE Study Committee on the Electrical Development of Little Developed Countries with particular reference to Tropical Countries. Mr. Clements was responsible for the Report on Electricity Supply in Jamaica, which made the now adopted recommendation for the ultimate standardization of frequency at 50 c/s.

Mr. D. MacLeod, A.M.I.E.E., station superintendent at Castle Meads generating station, Gloucester, of the South Western Division, British Electricity Authority, has been appointed station superintendent of the new East Yelland station of the South Western Division, and takes up his new appointment early in the new year. Mr. MacLeod received his training with the Keighley Corporation Electricity Department and Vickers, Ltd., and his technical education at Keighley and Bradford Technical Schools. After a short period as shift charge engineer at Halifax, he went to Croydon in 1932 where he held the successive appointments of shift charge engineer, deputy station superintendent and acting station superintendent. After a short period at Exeter he went to Gloucester earlier this year.

Mr. D. MacLeod

Miss M. B. de Peare has retired from the service of Falk, Stadelmann & Co., Ltd., having completed fifty years as a member of the staff. Miss de Peare joined the company in 1902 and finally became manageress of the Secretarial and Typing Department. The directors have presented her with a radio set and a cheque.

Ald. J. Minto, J.P., a member of the East Midlands Electricity Board, recently opened a "Better Living" Exhibition, organized by the English Electric Co., Ltd., at

Mr. J. E. Cole (left), manager of the Leicester Branch of the English Electric Co., Ltd., presenting a plate warmer to Ald. J. Minto at the opening of the company's "Better Living" Exhibition

Leicester, and to mark the occasion, Mr. J. E. Cole, manager of the Leicester branch office of the company, presented him with a plate warmer.

Mr. R. J. D. Cakebread, A.M.I.E.E., formerly in the Transmission Department, B.E.A. London Division, has now joined the Transmission Design Department at the Bankside headquarters of the B.E.A. as a second assistant engineer.

Dr. E. Rosenberg, who was well known in this country before the 1914-18 war as chief electrical engineer to the British Westinghouse Co., celebrated his eightieth birthday on 28th November. He is now residing in Bogota, Colombia. In his earlier years he was responsible for the design of electrical generating plant, and his wide field of activities also included train lighting experiments, and the design of a d.c. dynamo which was used also as a generator for arc lamps, searchlights, welding and melting apparatus.

Changes in the Cabinet announced last week included the appointment of **Sir Arthur Salter** as Minister of Materials. **Lord Swinton,** who previously held the dual appointments of Minister of Materials and Chancellor of the Duchy of Lancaster, becomes Secretary for Commonwealth Relations.

Sir Arthur P. M. Fleming, C.B.E., director of research and education, Associated Electrical Industries, Ltd., and a director of the Metropolitan Vickers Electrical Co., Ltd.,

is to succeed **Sir Edward Crowe,** K.C.M.G., as president of the British Association for Commercial and Industrial Education (Bacie). Sir Edward, who is a director of the English Electric Co., Ltd., and W. T. Henley's Telegraph Works Co., Ltd., will hand over the presidency to Sir Arthur Fleming at a luncheon to be held at the Waldorf Hotel, London, on 16th December.

Mr. H. Hinchcliffe, A.M.I.E.E., consumers' engineer in the Halifax district of the Yorkshire Electricity Board, has been appointed local manager in charge of the Board's commercial activities in the Brighouse, Spenborough and Heckmondwike areas.

Mr. A. E. Iliffe (director, Benjamin Electric, Ltd.), was elected president of the Electrical Trades' Commercial Travellers' Association at the recent annual meeting of the Association. The new chairman is **Mr. F. N. Woods,** sales superintendent, lamps and lighting, Metropolitan-Vickers Electrical Co., Ltd. The following allocations have been made from the Benevolent Fund :—E.I.B.A., 350 guineas; Commercial Travellers' Schools, 225 guineas; I.E.E. Benevolent Fund, ten guineas; Commercial Travellers' Benevolent Institute, two guineas.

Mr. J. F. Wallace, who has been general secretary of the Electrical Power Engineers' Association since 1945 (he succeeded Mr. W. Arthur Jones), is to retire from that position at the end of the year. His successor is **Mr. H. Norton,** at present deputy general secretary.

Mr. Norton was born at Wigan in 1908 and was educated at King Edward VII School, Sheffield. After serving in the Sheffield Transport Department, he joined the E.P.E.A. staff in 1944 as an assistant secretary in Scotland and the north. He became national negotiations secretary in 1947 and deputy general secretary a year later.

Mr. H. O. Mayfield, senior assistant secretary, becomes deputy general secretary of the Association. He had electrical manufacturing experience before joining the former Metropolitan Electric Supply Co. He was appointed assistant secretary, London area, of the E.P.E.A. in 1948, becoming senior assistant secretary two years later.

Mr. J. F. Wallace

Mr. H. Norton

Mr. A. M. F. Palmer, A.M.I.E.E., M.P. (who now contributes our Parliamentary commentary—" Industry and the House "), is to be editor of the Association's journal, the *Electrical Power Engineer*, and will be responsible for the research, publicity and educational work of the Association.

Mr. J. Parry, general manager of Crypto, Ltd., has been appointed to the board of directors.

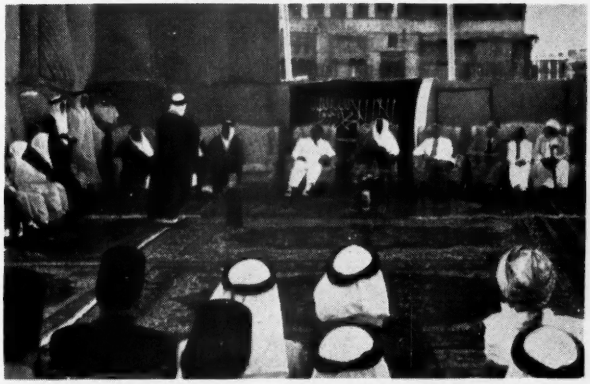
Mr. F. Moores, B.Sc.(Eng.), A.M.I.E.E., has been appointed manager of the Capacitor Department of Johnson & Phillips, Ltd., as from 1st December. Mr. Moores was formerly with British Insulated Callender's Cables, Ltd., at Helsby, where he has been concerned for over twenty-five years with every aspect of the capacitor business. During the war he worked in conjunction with various Service Departments and was responsible for the development of the delay networks and special capacitors for radar. Mr. Moores has also served on B.E.A.M.A., B.S.I., and E.R.A. committees dealing with capacitors.

Mr. F. Moores

On 26th November the **Hon. Mrs. Leslie Gamage,** C.St.J., county superintendent, Berkshire, accompanied by Mr. Horace F. Parshall, M.A., director general, St. John Ambulance Association, visited the Witton Works of the General Electric Co., Ltd., to see for themselves the important part played in industry by the members of the Association. At this works there are two ambulance divisions, one nursing division and two cadet divisions. The visitors were welcomed by Mr. J. J. Gracie, C.B.E., director, Witton Engineering Works, who is president of the Birmingham St. J.A.A. and of the five G.E.C. Witton Divisions. After lunch the party left for the Works where Mr. Parshall inspected a guard of honour before making a detailed tour of the St. J.A. Divisional Headquarters and the Medical Centre. Mock casualties were treated to demonstrate the vital need for prompt and correct treatment of injuries.

Earlier this year E. A. Juffali & Bros., agents for the General Electric Co., Ltd., in Saudi Arabia, opened new showrooms and offices in Jeddah. To mark the occasion,

H.R.H. Prince Abdullah El-Feisal, Deputy Viceroy and Minister of Interior and Health, with some high officials of Government and foreign ambassadors, were addressed by Mr. Gazzawi, H.M. The King's Private Poet, on the roof of the new building.



H.M. The King's Private Poet addressing Prince Abdullah El-Feisal on the roof of the new showrooms of G.E.C.'s agents in Jeddah

On 14th November the staff of Metway Electrical Industries, Ltd., attended a meeting at which **Mr. D. G. E. Barrie,** managing director, reviewed the progress of the company during the past year. He said that although the year had been a difficult one he had decided to give the staff a bonus of 15 per cent on their gross wages, plus ½ per cent for each complete year's service. Referring to the current year, he said sales had fallen during the early part, but there had been a general improvement of late. All senior staff and executives were later entertained to a dinner at the Seven Stars, Brighton.

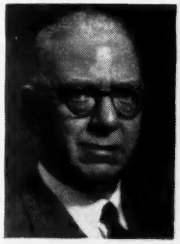
Approximately 400 members of the staff of **British Insulated Callender's Cables, Ltd.,** Group, from Southern Branch offices, Construction Company district offices and Erith Works, were entertained to a dinner, dance and cabaret at Seymour Hall, London, on 21st November. During the evening Mr. H. J. Stone, director and deputy chief executive of B.I. Callender's Cables, presented to Mr. D. T. Hollingsworth, chief engineer, a " new type " of three-core cable, made with a cake mixture and marzipan. A vote of thanks to the board for its hospitality was proposed by Mr. C. A. E. Crick, district engineer, Bristol, and Mr. Stone replied.

T. Clarke & Co., Ltd., electrical contractors, celebrated another successful year's work at the annual staff dinner, held at the Holborn Restaurant on 29th November. The company was established in 1839 and pioneered in the electrical contracting business. Sir Harold Moore was the chairman from its inception until 1950, and Mr. A. J. Shrosbery became managing director in 1945. Nearly 250 members of the staff from London and branch offices, and from overseas, attended the dinner, amongst whom were Messrs. W. Blackie, H. Chalk, S. Charlton and J. Simpson, all with more than thirty years' service with the company. Mr. A. J. Shrosbery, during a speech, said that Mr. T. Burke was leaving this country early in December, to manage the company's interests in **Kuwait.**

OBITUARY

Mr. Robert L. Reid, A.I.Mech.E., who was for forty-six years with Dundee Corporation prior to his retirement five years ago, has died at his home in Broughty Ferry at the age of sixty-nine. He was resident engineer at the construction of the Port Carolina generating station, Dundee, in 1908, and from 1913 was in charge of the Department's constructional work.

Mr F. Gurney.—The death occurred on 27th November at a London hospital, after a brief illness, of Mr. Frank Gurney, M.I.E.E., whose appointment as home sales manager was announced recently by Metropolitan-Vickers Electrical Co., Ltd. Mr. Gurney had been with the company for over thirty years. He became assistant manager, home sales, in 1949. Mr. Gurney was chairman of the North Midland Centre of the I.E.E., 1941-42.



The late Mr. F. Gurney

Mr. Edward Salisbury Williams, superintendent of the Cwm Dyli power station, Snowdonia, of the Mersey and North Wales Division, B.E.A., has died at the age of sixty-five. He had been employed at Cwm Dyli since 1905, and was to have retired at the end of November.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

World Power Statistics

THE review and editorial mention of Statistical Year Book of the World Power Conference No. 6, contained in your issue of 21st November, has been noticed with much appreciation. May I, however, point out that the statement in the review to the effect that no figures for United States coal reserves have been returned, is somewhat misleading?

As indicated in the first paragraph of the introduction to the Year Book, if information on resources is not found, it should be sought in Year Book No. 5, and if not found there, in Year Book No. 4. In fact, data on American coal resources are to be found in Year Book No. 5, the date of the estimate being given as 1949.

The International Executive Council of the World Power Conference has decided, for reasons of economy, that complete data on resources shall be published at intervals of six years, normally in a year in which a Plenary Conference is held. In the Year Books published in other years, data on resources are only given where fresh data have become available or where data previously published require material correction.

C. H. GRAY,
Secretary, International Executive Council,
World Power Conference.
London, W.C.2.

Gas *v.* Electric Cooking

WHEN heating elements capable of running at temperatures in the vicinity of 1,800 deg C become available, then, and only then, will electric boiling rings be in a position to oust gas rings. At 1,800 deg C radiation can transfer the heat generated in the element effectively to the pan, pot or kettle.

The low-temperature elements at present in use are in some cases so cool that conduction must be depended on for heat transfer, and just a little bit of grit on the plate can reduce conduction enormously, especially in a draughty position.

The existing "open element" types are slow simply because very few can run at temperatures above 1,150 deg C, at which temperature the radiation is limited. An average gas ring flame can exceed 1,800 deg C, and its heat is transferred effectively to a cooking utensil no matter how irregular the heat collecting surface may be.

"OPHIUCHUS."

Electric Cooker Design

AS a contribution to the discussion in our pages of electric cooker design Mr. F. L. A. Morris (Penrith) has sent us particulars of a cooker for which he has filed a patent application. This has four separate compartments in vertical arrangement. At the top is an oven 21in square and 15in high with the wiring and switches contained in a flat compartment (3in deep) above it. The bottom of the oven is about 46in above floor level. Next below comes a grill and boiling cupboard with a grill in the "ceiling" and three radiant boiling plates in the "floor" at a level of 25in; this has a height of 18in and is provided with a door. Beneath this is a hotcupboard 8in high and at the base a 12in high utensil cupboard. The overall height is 5ft 4¼in and the total loading 9 kW.

Mr. Morris suggests that the only castings needed are the oven door and frame. The main structure could be of braced angle iron and the body of vitreous enamelled sheet.

Electricity Charges

ON Tuesday last the British Electricity Authority stated that in spite of recent increases which the electricity supply industry had had to face in salaries and wages, and freight and interest charges, it did not contemplate any immediate general increases in electricity tariffs. It was hopeful that in the present national situation it would be possible to avoid any further general raising of charges to consumers notwithstanding the continuing risk that the industry might, for the first time, incur a deficit in the current financial year. The Authority emphasized, however, that if the increased costs now being borne were aggravated by any further substantial financial burdens, immediate general increases would be unavoidable. This decision did not affect adjustments of tariffs which were being made in consequence of other prior considerations.

THE BEAMA CATALOGUE

New Features Introduced in the Second Edition

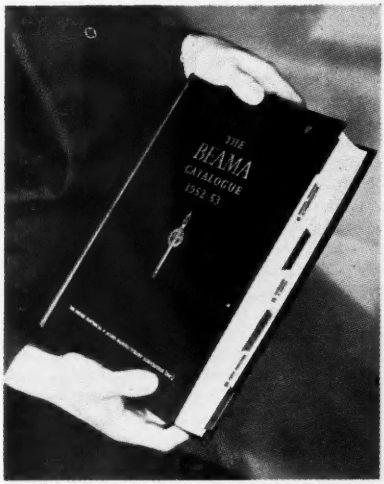
FROM the electrical industry's point of view one of the most potent agents in maintaining and increasing export trade has been the BEAMA Catalogue which made its first appearance three years ago. As a comprehensive guide to the wide range of products (practically everything electrical) made by members of the British Electrical & Allied Manufacturers' Association it has been of inestimable service to buyers in all the world markets. Now a second edition has been published* embodying a number of additions and improvements.

Five-Language Glossary

This time a five-language glossary (English, French, German, Portuguese and Spanish) is included to help foreign buyers in studying the catalogue. The body of the publication classifies products in three main groups. Division I covers power plant from boiler-house equipment to turbo-generators and also includes distribution equipment, motors and control gear, insulators, bushings, etc. Division II is devoted to electrical equipment in industry, transport and communications and includes a very wide range of equipment for all classes of industry and services. Division III contains particulars of domestic and commercial appliances, lighting accessories and installation material. All three sections are copiously illustrated and colour has been used throughout.

Following the before-mentioned glossary and indices there is a buyers' guide containing the names of manufacturers under product headings. A trade directory section gives names and addresses of B.E.A.M.A. members, with particulars of overseas representation, and the volume concludes with a catalogue index—an alphabetical list of manufacturers with indications of where in the catalogue their products are dealt with.

* "The BEAMA Catalogue, 1952–53," published for the B.E.A.M.A. by Iliffe & Sons, Ltd., for private distribution. Pp. 1,020 (12in by 8¼in).



Over 15,000 copies have been distributed to buyers, distributors, public utilities and Trade Commissioners in every country of the world.

Export Trade Expansion

At a luncheon held at the Connaught Rooms, London, W.C.2, on Monday last to launch the Catalogue, there were many representatives of the Government, of overseas Governments and of British manufacturers. The toast of "Exports and the British Electrical Industry" was proposed by Sir Harry Railing, president of B.E.A.M.A., who occupied the chair.

Sir Harry Railing appealed to the Government to ensure an adequate supply of electricity and to reduce the taxation of industry which was draining away 70 per cent of its lifeblood.

Turning to the important part played by the electrical industry in Great Britain's export trade, Sir Harry said that the industry employed 600,000 workers, or 7 per cent of the country's total. Last year its exports were valued at £190 million and this year would reach £210 million or 7 per cent of the country's total exports.

The B.E.A.M.A. had aimed at creating an electrical industry which could stand

four-square to any other in the world with regard to capital resources, quality, competition and service, and which would lead the world in research and development. While B.E.A.M.A. valued to the utmost individual enterprise and effort, the members joined in co-operative work when it served the interests of the industry and the country as a whole.

One of these co-operative activities was the launching of the BEAMA Catalogue which gave a picture clearly showing what the British electrical industry could do, how completely the vast electrical field was covered and how many sources of supply for each speciality were available. The new Catalogue marked a great advance. It was now equipped with four additional languages and it had increased in size and circulation. Its aim was to show all the world what the electrical industry was doing and give them confidence that they could not do better than to come to this country for electrical goods.

Our prices must be competitive or we would not have gained our present position. As regarded delivery, while we were handicapped in the immediate post-war period the position had rapidly improved in the last twelve months. Finally there were the questions of quality, reliability and long life which were important everywhere—but particularly abroad and in the engineering industry.

In all these factors the electrical industry wished to be judged both by its past performance and by the present facilities which it could offer, which stood as high as they ever stood before.

Government Policy Outlined

Replying to the toast, Brigadier H. R. Mackeson, Secretary for Overseas Trade, said that this country had gained a breathing space but unless sterling was sound the whole economic life of the country was in danger. Some of our competitors were subsidized by their Governments; it was the aim of the British Government to secure a strict limitation of these subsidies. They also intended, however, to ensure that British exporters were able to offer attractive terms to overseas buyers. Extended credit guarantees would be granted in approved cases.

After agreeing that an adequate supply of electricity was essential to industry, Brigadier Mackeson said that Great Britain could only survive by pursuing an expansionist policy and in this the electrical industry was making a notable contribution. He urged electrical manufacturers to be sure of offering competitive terms in prices and delivery.

Conditions Abroad

He regretted the reduction in Australia's purchases from this country, but was glad to see that there had recently been some improvement. Shortage of sterling had limited trade with Argentina but again he hoped for improvement. He was confident that the Canadians were glad to have us in their ever-expanding market and prospects were good in other directions.

Sweden was our greatest trading partner in Europe but if we were to sell goods there aggressive salesmanship was essential.

The speaker referred to the trade mission to Latin-American countries and advised electrical manufacturers to "pick their brains" upon their return for there was ample scope for greater trade in these markets.

The BEAMA Catalogue was a generous contribution by the electrical manufacturing industry to the improvement of export trade and a useful aid in extricating ourselves from our present difficulties.

Educational Films

Additions to E.D.A. Series

FOUR further additions have been made by the British Electrical Development Association to its series of educational films. These are probably more "difficult" than usual, but still well suited for the tuition of young technical students.

The first of the new films, a Press "preview" of which was held in London on Tuesday last, is entitled "Ammeters and Voltmeters." It follows up the earlier series on electrical units and graphically explains the operation of moving iron and moving coil instruments.

The other three are really one film in three sections dealing respectively with capacitors, inductors and power factor. Effects and applications are illustrated in a lucid manner. The power factor film should be particularly useful in giving students a sound idea of this somewhat elusive facet of a.c. work.

Merton Park Studios, Ltd., were again responsible for the films, with Mr. F. A. Hoare as producer and Mr. John Durst as director. E.D.A. provides 16 mm copies of these films on free loan or for purchase.

Industry and the House

Transport and Steel

By A. M. F. PALMER, A.M.I.E.E., M.P.

THIS has been, in the purely Parliamentary sense not always appreciated by those outside the Palace of Westminster, an exciting two weeks. Fresh procedure problems, each taking an unexpected twist calling for much research into dusty precedents by Mr. Speaker, seem to have arisen daily. The decision by the Government to bring the guillotine into our affairs on the disputed Transport Bill has provoked a lively spirit of resistance on the Opposition back benches which has led to some piquant situations for both front benches.

The "Guillotine"

Of course, every Opposition worth its salt denounces the use of that fearsome instrument the guillotine—in formal language the "timetable"—as an act of the blackest tyranny. Not to be outdone in respect for tradition every Government worthy of the title regrets from the bottom of its tear-heavy heart the hard necessity which has forced resort to it. If only Governments would govern with moderation cry one side; if only Oppositions would oppose with responsibility cry the other!

The Transport Bill and the Iron and Steel Bill have both now had their second reading debates. Their justification, as argued by Conservative spokesmen, is that they are commonsense empirical measures designed to restore realism and efficiency in two important industries much bedevilled by doctrinal planning. Labour speakers repudiate the charge of inefficiency and ideological domination and counter-charge the Government with giving way to sectional interests at the expense of the community as a whole.

The Transport argument is different from Iron and Steel in this sense: on Transport there is much criticism heard from the Government's own friends, both inside and outside the House; Steel is in the main a straightforward argument on principle between the political parties.

The Minister of Transport, Mr. Lennox Boyd, has been perhaps too open in confessing the defects of his Bill—far too many people are coming to believe he is right. For instance, the Associations of Chambers of Commerce have expressed in frank terms their fear that a sudden dispersal by rapid sale of the nationalized industry's lorry fleets may cause confusion and worse for private traders. Sir Ralph Glyn, the veteran Conservative Member for Abingdon and a former director of the L.M.S., speaking in the debate with all the weight of his long experience of railway finance, asked that there should be an independent inquiry into the whole business of rail and road costs and charges before further changes were decided upon.

Speeches from the Opposition

Mr. Barnes and Mr. Callaghan led the Opposition attack; the former as the Minister for the nationalizing Act denounced with obvious personal feeling the wanton destruction, as he saw it, of his departmental brain-child. Mr. Callaghan repeated Labour's warning that in the event of re-nationalization of road transport nobody must expect to be compensated twice.

But none of this seemed to ruffle the smiling, supremely confident, Mr. Lennox Boyd. He feels that, as Minister, he has already vastly improved his proposals in comparison with the original White Paper and, given a constructive Committee stage, further advances can be made along the road to perfection. Certainly he doesn't look or speak like a man doomed to failure.

The Steel Bill is a horse of a different colour as they say. Conservatives are convinced that the principle of the Bill, with its emphasis on public control as distinct from public ownership, is the last word in progressive industrial legislation. Mr. Harold Macmillan, who has the appropriate personal advantage of looking charmingly Victorian

in the grandest manner, commended the new steel proposals to the House as being in the best Disraelian tradition. Here was apparently the perfect synthesis of freedom and order; the primrose middle path between the extremes of unbridled individualism and bureaucratic collectivism.

But Mr. Strauss when he spoke flatly refused to accept the new Control Board as being anything else than an outer dressing for the sake of appearance. Behind it he alleged the old selfish monopoly forces were regrouping for a new lease of life at the expense of the public.

A novel feature of the new Iron and Steel Bill is, of course, the bringing into the span of control of the proposed supervisory Board all kinds of ancillary firms untouched by the nationalizing Act. This, to the Bill's adherents, demonstrates the superior logic of the Conservative approach; Labour was quick to hint, however, that this would be a possible precedent to be remembered on re-nationalization.

Mr. Churchill's administration is apparently finding it necessary to reshuffle its economic team. Sir Arthur Salter's post of Minister for Economic Affairs is to be abolished and he goes to the Ministry of Materials in place of Lord Swinton. Mr. Richard Maudling, an outstanding Conservative intellectual, is to be moved into the Treasury as Economic Secretary—an old office revived. It is curious how ministerial positions, abandoned for a time, have a trick of finding fresh occupants once the incoming Ministry becomes really acquainted with the needs of the situation.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Commons last week Mr. Palmer asked the Secretary of State for Scotland if the views of the chairman and members of the North of Scotland Hydro-Electric Board had been sought in connection with the examination of the supply of electricity in Scotland, promised in the Queen's Speech; and if he would give an assurance that consultations would be held with the trade unions representing all grades of employees in the electricity supply industry.

Mr. Henderson Stewart, who replied, said that the Secretary of State for Scotland and the Minister of Fuel and Power were aware of the views which the chairman of the North of Scotland Hydro-Electric Board had expressed on this subject and they hoped to have consultations in the near future with representatives of that body and of the other electricity authorities concerned. They would also be ready to consider any views which representatives of those employed in the industry might wish to put before them.

Mr. Palmer asked if the Minister would agree that Mr. Thomas Johnston, chairman of the North of Scotland Board, was not at all happy about the implications of this scheme.

Mr. Henderson said he had difficulty in accepting that, and he would repeat the assurance given by the Secretary of State on 18th November. He did not contemplate that any change in the present organization of the electricity industry in Scotland would impair the special responsibilities for the Highlands and Islands placed on the North of Scotland Hydro-Electric Board.

Commercial Television

Replying to Mr. Reeves, the Assistant Postmaster General (Mr. Gammans) said that 24 inquiries had been received about licences to operate commercial television stations and 21 applications from other persons for time for sponsored television programmes. Without consent of the applicants it would be improper for him to disclose their identities. The Postmaster General would grant licences on the advice of the controlling body described in Command 8550 but it was much too early to say on what conditions licences would be granted.

Tax on Hot-Cathode Tubes

Major Guy Lloyd asked if fluorescent hot-cathode tubes could be exempted from purchase tax. Mr. Boyd-Carpenter said that the suggestion was being considered.

R.A.F. Wiring Contracts

Mr. Frederic Harris asked the Under-Secretary for Air what was the value of orders of internal electrical wiring contracts placed with the Electricity Boards by his department in the 12 months ended September, 1952, compared with the value of orders placed with private electrical contractors.

Mr. George Ward said the figures were £276,000 and £857,000 respectively.

Coal Sampling

Landry's Theory Discussed

AN account of recent work carried out for the British Standards Institution with the object of determining whether Landry's theory of sampling (B. A. Landry, U.S. Bureau of Mining *Bulletin* No. 434 (1944) and *Transactions*, American Society of Mechanical Engineers, Vol. 67, p. 69, 1945) could be applied to British coals was given in a paper Mr. E. H. M. Badger (chairman of B.S.I. Sub-Committee SFE/45/7) submitted to the Institute of Fuel in London this week. The results of twelve experiments have not indicated any general relation between the variance of sampling and the weight of the individual increments, treated as separate samples.

The ash in coal seems to be segregated in a manner which is unpredictable on theoretical grounds. If a scheme for sampling a particular coal is prepared solely by drawing on general experience, under-sampling or over-sampling may result. It is more satisfactory, says the author, to measure the accuracy of sampling in each case and it is suggested that this determination should be made on regular outputs, or deliveries, by the method of duplicate sampling. No evidence has been obtained to suggest that the B.S.1017 specification is not rigid enough for the majority of British coals, but it is hoped to introduce improvements in respect of simplification and definition of accuracy. When next revised, special attention will be given to errors of reduction and analysis with the object of minimizing them in practice.

DISCUSSION

In opening the discussion, Dr. A. C. Dunningham mentioned that plotting average error against ash content gave a belt of scattered points through which an average line could be drawn to represent the formula for sampling. Points above this line indicated over-sampling and points beneath it under-sampling. The coal-sampling procedure was usually questioned by the engineer if his heat balance was at fault; one could then either resort to over-sampling or else determine what the sampling schedule ought to be for the particular fuel, using Landry's method. A third (and preferable) alternative was to apply the principle of differences to obtaining the accuracy of sampling, as Brown and Liddell had suggested. The duplication of analyses then necessary did not involve much additional work. Each works had its own procedure, e.g., sampling a number of wagons or a single wagon or continuous sampling over a belt. The author's suggestions must be linked up with the procedure adopted in each case.

Choice of Method

Mr. F. D. K. Liddell emphasized that in planning experiments on sampling procedure the advice of the statistician should be sought at an early stage. There were two approaches to the problem, the first being to estimate some quality of the coal and then determine its accuracy. The second approach was by statistical theory, as illustrated by the author in his wedge and stipple patterns of distribution of ash in coal. The best method of sampling depended upon the type of distribution. Landry's theory would take too long to work out for each set of results. Nevertheless, experiments with sampling methods should be continued. The N.C.B. took 300,000 coal samples in 1949 and 500,000 in 1952, and a reduction in sampling would save much work.

Mr. D. Hicks mentioned that the International Organization for Standardization, of which he was chairman, had brought the experimental work described in the paper to the notice of many other countries, and similar work was now being carried out in the United States and elsewhere. Duplicate sampling might result in serious systematic error being overlooked.

Mr. G. Nonhebel explained that "patchiness" of coal might be due to mixing back fines from the cleaning plant. Coal had often been sampled with unnecessary accuracy (½ per cent or less), since in boiler efficiency calculations the

" unaccounted " figure was often as high as 5 per cent, whereas boiler manufacturers allowed a tolerance of ± 2 per cent on their quoted figures. A good method of wagon sampling " as received " was badly needed by industrialists for checking the quality against N.C.B. specification.

Mr. R. C. Tomlinson pointed out that the advice of the statistician had sometimes reduced sampling work at the colliery to one-fifth. The risk of bias in sampling was serious, 5 per cent difference in results being not unusual as between two parties in dispute. The eventual solution would be the use of automatic samplers.

Mr. R. W. Reynolds-Davies emphasized the necessity for co-operation between the statistician, the mining engineer and the fuel technologist. Prior information about the geological formation of the coal seam from which the sample came was most helpful.

In his reply, Mr. Badger mentioned that, in considering average sampling errors, the small errors which were in the aggregate so important might be overlooked. Systematic errors could not be eliminated by taking a larger number of samples. If belt sampling were used, samples must also be taken when the belt was stationary. The standard of sampling accuracy might well depend on the type of coal being tested. With wagon sampling it was difficult to avoid a biased result, and the problem was being investigated in co-operation with I.C.I., Ltd.

Substitutes for Nickel

THE present shortage of nickel makes it difficult to provide a nickel deposit on many types of article sufficiently thick to give sound protection under service conditions. As a result there exists great interest in alternatives to a heavy coating of nickel as an undercoat to chromium plating for ordinary decorative and protective purposes.

A number of substitute undercoats have been suggested and many claims have been made for them. For example, white brass (80 per cent zinc, 20 per cent copper) and tin bronze (90 per cent copper, 10 per cent tin) have been suggested, while in some cases satisfactory results have been claimed for chromium plating either directly on a copper deposit or on a heavy copper deposit followed by a thin coating of nickel. There appears to be little or no reliable comparative information about the performance of these alternatives.

It is obviously desirable to obtain an indication of how the various coatings will withstand atmospheric corrosion in general service conditions, but because accelerated corrosion tests are unreliable, the only acceptable method is to place a large number of samples in several different atmospheric corrosion sites and to average the results.

The British Non-Ferrous Metals Research Association has instigated a large-scale investigation on these lines. Over a thousand sample steel stampings have been plated by various processes by member firms and others. These are being exposed at three atmospheric exposure sites, representing a marine area and two types of industrial area, mild and severe. A further set is being subjected to an accelerated corrosion test for comparison purposes.

The thicknesses of plating applied are checked by means of microsections, and the results of the tests will be assessed on a quantitative basis and averaged so as to give a reliable indication of the performance of the specimens. Each type of plating has been duplicated by two different plating shops, and four samples of the work of each are exposed on every site. Both standard and proprietary solutions have been used. Half the specimens will be regularly cleaned while the remainder will be left untouched.

These tests will soon yield information on the performance of the various types of finish employed of great importance to industry in the selection of finishes.

New E.A.W. Branch

THE Ashton-under-Lyne and District Branch of the E.A.W. was formed recently at a meeting when the chair was taken by Miss N. Kenyon, chairman of the North Western Area Federation of the E.A.W., member of the Association's National Executive Committee, and member of the North Western Electricity Board. Speakers were Sir Joseph Hallsworth, chairman of the North Western Electricity Board; Miss B. Card, branch development secretary from E.A.W. headquarters; Mrs. Shires, chairman of the new Branch, and Mr. L. Binns, sub-area manager, N.W.E.B. The hon. secretary is Miss Cross and the hon. treasurer Mrs. Dudley.

Commerce and Industry

The Case for Electricity

Minister and Building Controls

IN our leading article we refer to the activities of a group of Members of Parliament who feel the need for counter-measures against the influences operating in Parliament and elsewhere against the use of electricity. The Members are Sir Arnold Gridley, K.B.E., M.I.E.E., Mr. F. J. Erroll, A.M.I.E.E., A.M.I.Mech.E., Mrs. Hill, Mr. S. J. McAdden, Sir Sidney Marshall, D.L., and Sir Wavell Wakefield.

The group has prepared a pamphlet, "Electricity and Its Place in Greater Fuel Efficiency," which has been circulated to all M.P.s, to the National Press and others.

It marshals the arguments (most of them familiar to readers of the *Electrical Review*) in favour of the use of electricity and reflects upon some of the main arguments of opponents. Stress is laid on the poor quality of the coal used in power stations and upon the need for the fullest possible use of generating plant unless electricity is to be inordinately dear both to industry and the general public.

It is shown that purely thermal comparisons (which are not always detrimental to electricity) are not the sole guide in selecting "fuel" and the right of the public to choose freely is maintained.

Specialists and Sub-Contractors

Mr. David Eccles, Minister of Works, was the principal guest at the annual luncheon of the Federation of Associations of Specialists and Sub-Contractors held at the Apothecaries' Hall, London, E.C.4, on 26th November. Mr. D. H. Green, O.B.E., president of the Federation, presided and proposed the toast of "Her Majesty's Government." In the course of his speech Mr. Green suggested that relaxation of control in the building industry should proceed by trades rather than generally. He also referred to the unwelcome increase in the amount of "retention money" experienced by sub-contractors since 1945 and urged the Minister to do what he could to remedy the situation.

In his reply Mr. Eccles promised to discuss this matter with the Minister of Housing and Local Government. With regard to the relaxation of controls, he said that although this seemed attractive it was found to be difficult to define areas of work. It was considered better, therefore, to decontrol on general lines. Mr. Eccles said that the Ministry's object was to increase the flow of work consistent with the resources available.

The health of the guests was proposed by Mr. F. Woodcock, chairman of the Council and president-elect of the Federation, and the response was by Mr. Howard Robertson, president of the Royal Institute of British Architects.

J. & F. Stone to Appeal

We are informed by J. & F. Stone Lighting & Radio, Ltd., that notice of appeal is to be lodged against the judgment given against them and the Chain Store Finance Trust, Ltd., at the Central Criminal Court on 21st November. The case, which was reported in our last issue (p. 1188), concerned the alleged sale of television sets in contravention of the Hire Purchase Order made this year.

Electricity Board Training Courses

Further successful training courses for service centre assistants, demonstrators and housecraft advisers have just been completed by the South East Scotland Electricity Board. The courses, which lasted five days, covered a wide range of subjects and gave the staff an opportunity of discussing their problems with specialists, from Board headquarters, manufacturers and the E.D.A. as well as acquiring information on the latest developments in electrical appliances. Talks were given on most of the popular appliances, including cookers, refrigerators, water heaters and washing machines, while other lectures dealt with tariffs, service centre accountancy, display and salesmanship.

Power Unit for Large Crane

A self-contained diesel electric generating unit made by A. C. Morrison (Engineers), Ltd., Loughborough, is being used to supply electricity to a German-made Liebherr tower crane owned by Thomas C. Wild (Machinery), Ltd., which is at present being used in the building of Toplocks Secondary School at Southall, Middlesex. The plant is rated at 25 kVA, the prime mover being a Petter four-cylinder diesel with Bryce fuel injection, direct coupled to a generator and exciter. It is provided with automatic voltage regulation and its output is at

normal a.c. mains voltage. This compactly designed plant is of robust construction and is easily transportable. The crane itself has four motors to move it backwards and forwards along its rails and to raise and lower loads; the height from the ground to the end of the traverse is 105ft. The crane can handle weights of up to two tons, according to position, up to 16ft from its centre of gravity and it is provided with an automatic cut-out to prevent overloading. Although it weighs 16 tons without the power unit it can be assembled by four or five men in a day, and dismantled in about four hours.

Women's Wage Increase

Following upon the increase of 7s 4d a week in the wages of adult male workers in the engineering industry, it is announced that women workers over 18 years of age are to receive an addition of 6s 5d a week. Younger girls are also being given increases.

Plant for Jamaica

An order for a second 12,500 kW Brush Ljungstrom turbo-alternator set has been received by the Brush Electrical Engineering Co., Ltd., from the Jamaica Public Service Co. Both sets are to be installed in the Hunts Bay power station, Kingston, Jamaica. The consultants are Ewbank & Partners, Ltd.

New Mullard Factory

To cater for the increased commercial activities of the Mullard Equipment Division, Mullard Equipment, Ltd., has recently acquired another factory at Wandsworth in Garratt Lane, London, S.W.18. All engineering development facilities, together with centralized workshop areas, are now being concentrated in the older factory at Brathway Road. At Garratt Lane are housed the main assembly and production lines for all classes of equipment, as well as factory administration and service departments. Research and advanced development will continue to be done at the Mullard company's research laboratories at Salfords, Surrey.

Steam Plant Agreement

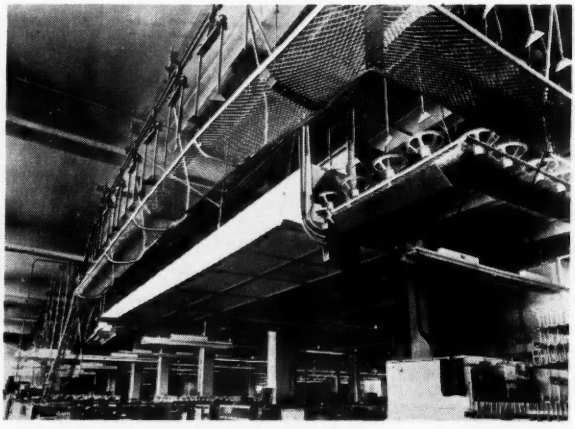
The Riley Stoker Corporation of Worcester, Massachusetts, and John Brown & Co., Ltd., have concluded an agreement which secures to John Brown a licence to manufacture and sell the Riley Stoker Corporation's design components and complete steam generating plant and equipment for use in land power generating stations.

Batti-Wallahs' Society

Viscount Hall, P.C., was the principal guest at last week's luncheon of the Batti-Wallahs Society, and in an interesting talk he related some of his experiences during his thirty years as a Member of Parliament, during which he has held a number of Ministerial posts, notably as First Lord of the Admiralty. We were pleased to hear from Mr. J. W. Perkins, the president, that Mr. H. Nimmo, a past-president of the Society, who recently underwent an operation, is making satisfactory progress.

Infra-Red Paint Stoving

An interesting installation for paint stoving loudspeaker assemblies, which incorporates a "Metrovick" infra-red oven suspended from the ceiling above the work benches, has been installed by T.C. Spray Finishing Systems at the works of the Plessey Co., Ltd. The assemblies, which vary from 5 to 10in in diameter, are conveyed through the 48ft long oven at a speed of 10ft/min on special hangers. The source of infra-red energy in this installation is provided by special "Metrovick" electric infra-red projectors fitted with tubular sheathed elements which operate at red heat. These elements consist of a spiral of high grade heat resisting wire tightly embedded by a special process in a mineral insulator, enclosed in an outer sheath of a non-scaling, non-corrodible alloy. The



"Metrovick" infra-red oven paint stoving loudspeaker assemblies

projectors themselves consist of trough reflectors in a robust frame designed for maximum strength consistent with light weight. The reflectors are constructed from high grade anodized aluminium sheet.

Plant for Canada

Last Friday Miss Laura Tatham, a Canadian journalist, joined the English Electric Company's Canadian apprentices in a tour of the Stafford works and Nelson Laboratories. She was shown round by Mr. R. L. Brown of the Export Department and Mr. C. A. Bourn, Education Department. The tour included a visit to the Medical Department, the Dental Department and the apprentices' school. Various Canadian machines were inspected, including a 106 MVA alternator for the Kemano-Aluminum Company of Canada and the second 60 MW hydrogen-cooled alternator for the B.E.A. Stourport station. In the Nelson Research Laboratories the visitors saw tests on h.v. circuit breakers.

Radio for South East Asia

Specially designed by the General Electric Co., Ltd., the final shipment of h.f. and v.h.f. radio equipment which the company are supplying for the Indonesian Police is now on its way to South East Asia. This contract, valued at £100,000, has been completed in a period of eighteen months in spite of the fact that much of the apparatus had to be designed to meet the particular requirements of the Indonesian authorities.

Prices of Materials

In the accompanying table we give the prices of the more important materials used in the electrical industry. The figures are those quoted on Monday last.

ALUMINIUM Ingots	ton £166 0s 0d
COPPER, H.C. Electro	ton £285 0s 0d
Fire Refined 99·70 per cent ..	ton £282 10s 0d
Fire Refined 99·50 per cent ..	ton £274 0s 0d
COPPER Tubes	lb 2s 8¾d
Sheet	ton £340 0s 0d
H.C. wire and strip	ton £336 0s 0d
LEAD, English	ton £92 10s 0d
Foreign	ton £91 0s 0d
MERCURY	flask £70 10s 0d
TIN	ton £951 0s 0d
ZINC, G.O.B. Foreign	ton £110 0s 0d
Electrolytic	ton £114 0s 0d
BRASS Tubes	lb 2s 2¾d
Sheet	lb 2s 5¾d
Wire	lb 2s 8¾d
PHOSPHOR BRONZE	
Wire	lb 4s 1¾d
RUBBER, No. 1 R.S.S. spot ..	lb 26d–26½d

Wholesalers' Delivery Van

The problem of carrying consignments of conduit in a delivery van, with electrical equipment and appliances, has been solved by F. Westerman (Wholesale), Ltd., who have had a van constructed which is fitted with a double floor leaving an aperture of sufficient size to carry conduit lengths totalling up to 12,000ft. A further advantage is that the heavy weight is low down in the vehicle, making for stability while travelling.

Delivery van designed for carrying conduit

Fatality at Electricity Offices

The *Weekly Mail* (Cardiff) reports that while cleaning the South Wales Electricity Board's offices at Dinas, Rhondda, Miss Phyllis May Pearce (48) received a fatal electric shock. At the inquest held at Tonypandy Mr. J. F. Wright (sub-area engineer) said that the fatality was attributable to three circumstances in combination: an automatic time switch, instead of being connected with a live wire was mistakenly connected with a neutral wire; an electric fire was incorrectly earthed, and Miss Pearce was standing on a wet concrete floor. A verdict of "Accidental death" was recorded, the jury adding that there had been lack of supervision of the electrical installations over a long period. It was stated that the Board had since taken steps to tighten up the inspection of equipment.

Claim Against Scots Board

A Perth foreman, who received a severe electric shock and lost five toes, and who raised his claim for damages from £2,500 to £3,000, has again raised his claim—to £4,500. The foreman, 39-year-old John R. Davidson, of 33, Struan Road, Perth, is suing the North of Scotland Hydro-Electric Board and D. R. Taylor, contractors, Perth. The action arises from an accident at the Board's substation at Abernethy in November, 1950. Along with four workmen, Davidson was removing a

" tin " shed on a lorry. The lorry driver followed a " track " of white tapes laid down by the Board's employees. When the lorry passed under high voltage cables, Davidson, who was holding on to the lorry, received a severe electric shock.

In the witness box, Davidson said he was given no warning by his employers about safety precautions. It was a rainy day. He resumed work last January, but not as a foreman labourer, which meant loss in wages. He did only light work. He had to walk downstairs backwards.

Robert Morrison, Abernethy, an employee of the Board, said the cable near where the accident occurred carried 33 kV. The recognized safety margin for men working close to the cable was 9 ft 9 in. The route was safe for empty lorries, but it could be dangerous if high loads were carried. The guiding tapes gave the requisite safety margin in a horizontal direction. It was clear that the shed on the lorry had come within a very short distance of one of the flexible copper hoops on the electrical equipment or had touched it for a brief moment.

The hearing was adjourned until February.

Northern Ireland Wage Dispute Settled

At a meeting of the Joint Industrial Council in Belfast on 24th November a settlement was reached in the wages dispute in the electricity supply industry. Schedule " A " rates will be increased by 2d per hour as from the first pay period following 4th November. The claim on behalf of the workers had been for 3d per hour, back-dated to 1st August last.

Festive Lamp Packing

An attractive Christmas pack of " Argenta " lamps is being distributed to the shops by Philips Electrical, Ltd. The side panels of the box show " Father Christmas " driving his reindeer team down a winter skyscape, and the box is in red and white on a background of shades of blue. There are two sizes. The larger contains two 100 W lamps and the smaller size two 60 W lamps.

Welding and Cutting Glossary

The British Standards Institution has recently published a revised " Glossary of Terms (with Symbols) Relating to the Welding and Cutting of Metals " (B.S. 499 : 1952). The considerable increase in the application of welding which resulted from the war and the many new techniques developed since the 1939 edition of B.S. 499 have necessitated a much more comprehensive treatment of the subject than was given previously. In view of the magnitude of the subject it was decided to divide the glossary into a number of sections dealing respectively with terms common to most types of welding; welding with pressure; fusion welding (welding without pressure); brazing and bronze welding; testing; weld imperfections; scheme of symbols; and cutting. Copies of this standard may be obtained from the B.S.I., Sales Branch, 24, Victoria Street, London, S.W.1, price 21s.

Helping the Blind

Its manifold activities in the interests of the welfare and training of the blind are shown in the report for 1951–52 of the National Institute for the Blind. The size and scope of the Institute brings with it wide fields of activity and interest of every kind, human, literary, scientific and technical, educational, and many others. All these find their place in the report. Once again the Institute appeals for financial support, and the report includes forms for those wishing to subscribe.

Springs

A survey of the British spring-making industry with a discussion of the principles and practical applications in some detail were given in a paper presented by Mr. W. E. Frost on 28th November before the North-East Coast Institution of Engineers and Shipbuilders, Newcastle-upon-Tyne. Reference was made to the numerous engineering processes involved in manufacture from rolling, forging and heat treatment and electro-plating to the usual or special machining work entailed. A high order of mathematics was said to be required when studying the elastic properties of cold-worked steel and material in the plastic condition.

Miniature Circuit Breakers

In the advertisement of Dorman & Smith, Ltd., last week the range of miniature circuit breakers was quoted as being up to 500 A. The figure should have been 50 A.

E.C.A. Birmingham Branch

A warning that there was on the market to-day a large amount of shoddy and dangerous electrical appliances was given last Friday by Mr. L. C. Penwill, director and secretary of the Electrical Contractors' Association, speaking in Birmingham. Quite apart from the consequent dangers, it was a tragedy that valuable manpower and materials were diverted to equipment which was unlikely to have a long life.

Mr. Penwill, who was responding to the toast of the " Electrical Industry " at the annual dinner of the Birmingham Branch of the Electrical Contractors' Association, said that critics of the industry claimed that electricity was produced from coal without any by-product, while gas making also produced coke. " They do not tell us that the coal which is used for electricity cannot be used for any other purpose whatever. Electricity is using a natural resource which would otherwise be completely wasted."

Mr. J. F. Gregg, Town Clerk of Birmingham, proposing the toast to the Electrical Contractors' Association, said that it was much more

dangerous to "monkey about" with electricity in Britain, because of the higher voltages used here, compared with Europe or America. Electrical appliances had helped to reduce the smoke pall over Birmingham and other cities.

Replying, Mr. W. T. Trace, president of the Association, stressed the importance of proper training for boys entering the industry. A boy of sixteen started work after being in an educational system which had hardly taught him to read and write.

Responding to the toast of "The City of Birmingham," the Lord Mayor, Alderman W. T. Bowen, said that the diversity of trade in the city meant that Birmingham had not known the trials and rigours of an industrial slump as had other areas which relied on one industry. He deplored that in the last fifty years big combines had grown up largely at the expense of the small man. Such growth did not necessarily lead to efficiency. Mr. W. A. Gazard, the chairman, proposed the toast to the guests.

Changes of Name

Airmec Laboratories, Ltd., has changed its name to Airmec, Ltd.

British Electronic Products (1948), Ltd., which became one of the subsidiary companies of the Lancashire Dynamo group in early 1950, has now changed its name to Lancashire Dynamo Electronic Products, Ltd.

The AC—Sphinx Spark Plug Co., Dunstable, has changed its name to AC—Delco, Division of General Motors, Ltd. A further extension to the factory has recently been completed giving a total floor area of 433,000 sq ft.

Trade Announcements

The Insuloid Manufacturing Co., Ltd., has moved to Sharston Works, Leestone Road, Wythenshawe, Manchester (telephone : Wythenshawe 2842).

The London office of the **Tudor Accumulator Co., Ltd.,** has now been removed to 137, Victoria Street, London, S.W.1 (telephone : Tate Gallery 0307). The London office of **Pritchett & Gold & E.P.S. Co., Ltd.,** has also been moved to 137, Victoria Street, S.W.1 (telephone : Tate Gallery 9212).

A new branch and store has been opened by **Enfield Cables, Ltd.,** at 9/9a, Bank Street, Aberdeen (telephone : Aberdeen 20319). The store will be in the care of Mr. J. T. F. Lippett.

Fitter & Poulton, Ltd., have appointed Mr. N. C. Ridge, 35, The Paddocks, Wembley Park, Middx, as agent for the sale of their conduit fittings and flexible metallic tubing in London and surrounding counties.

The **Electromotive Supplies & Services Co., Ltd.,** has removed to 115a, Red Lion Road, Tolworth, Surbiton, Surrey. The telephone number remains unchanged.

Mr. R. D. Eslick has been appointed to the staff of **H. Frost & Co., Ltd.,** incorporating H. Frost & Co. (Engineers), Ltd., Walsall, Staffs, as sales representative covering the counties of Yorkshire, Durham and Northumberland.

Catalogues and Lists

Wolf Electric Tools, Ltd., Pioneer Works, Hanger Lane, London, W.5.—Illustrated folder on "Wolf" electric tools.

Marconi Instruments, Ltd., Longacres, St. Albans, Herts.—Three technical folders dealing with the Universal Bridge (TF.868), circuit magnification meter (TF.329G) and F.M. receiver tester (TF.913).

Simplex Electric Co., Ltd., Broadwell, Oldbury, Birmingham.—"Lundberg" accessories price adjustment sheet for list LA.1912.

Nettle Accessories, Ltd., Harper Road, Wythenshawe, Manchester.—Leaflet illustrating new types of weatherproof rubber cable couplers.

Herman Smith (Smithlite), Ltd., Empire Works, Dudley, Worcs.—Three illustrated leaflets relating to fluorescent fittings and prismatic bulkhead fittings, together with new price list.

J. Rivlin, Ltd., 17, Brunswick Street, Leeds, 2.—Leaflet illustrating the "Coronet" circular fluorescent fitting.

Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.—Illustrated 32-page catalogue setting out the full range of Philips industrial products (PD.3444).

Birmingham Aluminium Casting (1903) Co., Ltd., Dartmouth Road, Smethwick, 40, Birmingham.—A guide to the selection of "Birmal" casting alloys in aluminium, magnesium and zinc.

Information Department

THE extensive records of our Information Department enable us to reply to most queries, but occasionally we ask our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the makers of the following:—

Tung oil and hardener (suppliers of).
"Cumberland" conduit fittings.
"Winkworth" alarm bells.

General inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by the Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Radio Interference Suppression

Regulations Governing Motor Vehicles

LAST week Earl de la Warr, the Postmaster General, laid regulations before Parliament which require suppression devices to be fitted to the ignition systems of all new cars, motor cycles, motor boats and the like, sold after 1st July, 1953, which radiate sufficient energy to interfere seriously with television reception. These regulations apply to all ignition apparatus forming part of an internal combustion engine other than an aircraft engine.

The regulations were made on advice received from an Advisory Committee set up under the Wireless Telegraphy Act, 1949. This Committee comprises persons, nominated by the President of the Institution of Electrical Engineers, able to express the views of those likely to be affected by the regulations, including motoring organizations, the radio and motor-car industries and the motoring public.

The regulations are the first of three measures to deal with the problem of electrical interference which although primarily concerned with television also affects other kinds of radio apparatus; further regulations are in preparation to cover electrical appliances and small electric motors.

Post Office Collaboration

Under the new regulations the Postmaster General may require assemblers and importers of motor vehicles to ensure that the interference radiated from their products is below a specified amount. The standard laid down is that the field strength of the electromagnetic energy, radiated at any frequency between 40 and 70 Mc/s in any direction, must not exceed 50 μV per metre at any distance of not less than 35ft. The Post Office will collaborate with manufacturers of ignition apparatus in advising on how the requirements can be satisfied and in making such tests as may be required.

All new cars, motor cycles, etc., assembled after 1st July, 1953, will remain within the scope of the regulations after delivery and there will be a penalty for removing suppressors. The owner of a car, motor cycle, etc., which has been fitted by the manufacturer or importer will be considered to have satisfied the conditions if he has kept the suppressors fitted and in serviceable order.

For vehicles already in use the Postmaster General will continue for the present to rely on the voluntary collaboration of owners. Many motorists have already done what is necessary to prevent their vehicles causing television interference (usually by fitting a suppressor costing 2s 6d at the distributor end of the lead from the ignition coil). It is hoped that the others will bring their vehicles and machines up to date by fitting suppressors, and that the question of compelling them to do so will not arise. A single suppressor at the distributor will usually suffice. Alternatively, suppressors incorporated in each sparking plug lead or resistive leads between the distributor and the plug might be used.

Contrary to common belief the fitting of suppressors does not adversely affect the performance of a vehicle. In fact, it has been asserted that they improve the cold starting of petrol engines and for that reason all British and American Service vehicles are fitted with suppressors.

Appliances and Accessories

Revised British Standard

THE British Standards Institution has revised B.S. 816, "Requirements for Electrical Appliances and Accessories," covering all electrical appliances and accessories other than electronic devices which are not more specifically dealt with by other British Standards. It applies to devices designed for use in single-phase a.c. circuits between 30 V and 250 V and d.c. circuits between 50 V and 250 V.

The requirements are divided into two parts, the first of which deals with materials, construction, finish, terminals, connection to the supply, cord grip, conductors, etc. It also covers safety requirements in some detail including the inaccessibility of live parts, provision for earthing and testing. The second part is more specific and covers joint and junction boxes, switch sockets, switches for use in lampholders and on flexible cords, lighting fittings, heating and cooking appliances, tumbler switches, and the appropriate tests.

Obviously a Standard of this kind cannot cover in detail all the requirements necessary and compliance with it is not a complete guarantee of performance and safety. In particular further requirements are necessary in the case of "double-insulated" appliances, as for example in B.S. 1645 "Vacuum cleaners," and an appendix giving guidance on these additional requirements is under consideration. Copies of this Standard (price 3s post free) may be obtained from the B.S.I. at 24, Victoria Street, London, S.W.1.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

"Foster Mother" for Piglets

A FORM of "foster mother" for piglets developed by the NICHROTHERM ELECTRICAL CO., LTD., Neway House, Mill Hill Road, Acton, London, W.3, combines an electrically heated feeder with an infra red heater. Designed to replace the sow forty-eight hours after farrowing, the unit will feed up to fourteen piglets and at the same time provide them with a comfortable warmth which should help to accelerate growth. It prevents overlaying, ensures equal and controlled feeding, and avoids risk of infection from the sow. By its use the mortality of the piglets, said to be as high as 30 per cent by natural methods, is claimed to be practically eliminated and it is possible to get an extra litter at least every two years. The hygienic teats cannot leak. The unit, which is finished in blue stove enamel, takes up considerably less space than the sow and her litter.

"Foster mother" for piglets

Die-handling Truck

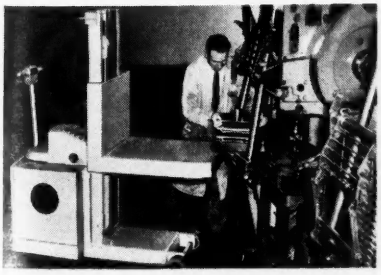
The electrically operated die-handling truck introduced by LANSING BAGNALL, LTD., Kingsclere Road, Basingstoke, Hants, enables large reductions to be made in the time required for setting up moulding and die-casting machines, power presses, etc. Essentially it is a pedestrian controlled vehicle driven by a 2½ h.p. traction motor which is fed from a 48 V 99 Ah lead-acid battery fitted to the vehicle. The 20 cwt capacity lifting platform is hydraulically operated, a separate motor providing the necessary power.

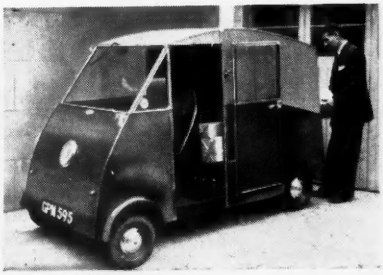
The vehicle weighs 16 cwt, is 60in long, 30in wide and has an overall height of 70in. It has a wheel base of 41½in and a turning radius of 50½in; the platform is 27in by 30in and it can be raised to a height of anything between 6in and 52in from floor level at a speed of 7½ ft/min. Normally the truck has a built-in charger but where it is required for shift work the batteries must be charged separately, a wall-mounted charger being available.

Delivery Van

With electricity at 1d per kWh the running cost of the 5 cwt battery delivery van made by the B.M.A. & ELECTRICAL EQUIPMENT CO., Lansdowne Works, Alice Street, Hove, 2, is

Left: **Lansing Bagnall electrically operated die-handling truck.** *Right:* **B.M.A. 5 cwt delivery van**





only 2d per mile, compared with 4¼d per mile for a similar petrol van. Other advantages are exceptionally low maintenance costs, instantaneous starting in any conditions, ease of driving, low overall length and good manœuvrability.

Equipped with a 54 V 140 Ah battery guaranteed for 2½ years, the van has a maximum speed of 17–18 m.p.h. and a range of 30–35 miles per day with an average half load. It has a turning circle of 20ft. The 4-pole series wound motor drives through double reduction chains running in oil to the off-side rear wheel, control being by means of a Sharp three-stage foot-operated controller.

The built-in battery charger incorporates a metal rectifier and a Sunvic automatic relay to bring in the low finishing rate. Complete in priming coat the van sells at £475, plus £42 4s 5d purchase tax in this country.

Electrostatic Voltmeter

The "Scalamp" electrostatic voltmeter has been developed by W. G. Pye & Co., Ltd., "Granta" Works, Cambridge, primarily for use in the television field, but its compactness, portability, ease of operation and accuracy make it suitable for a wide range of applications. The movement comprises a specially designed vane held near a well-insulated electrode by a taut-suspension of the galvanometer type. The movement is critically damped in all circumstances by a magnetic device. The lamphouse is integral with the front panel and the inside face carries the optical system, the external face comprising a removable panel on which the 4 V lamp is mounted.

The standard instrument is fitted with a transformer for use on 200–250 V a.c. mains, connection being made through a two-pin plug recessed into the front panel. Provision is also made for 4 V battery operation if required. Instruments are at present available with ranges of 1–5 kV d.c. or a.c.; 3–10 kV d.c. or a.c.; or 5–18 kV d.c. and 5–12 kV r.m.s. a.c. The accuracy is 1 per cent of full scale on all d.c. ranges and on a.c. up to 12 kV r.m.s. to a maximum of 100 Mc/s.

H.R.C. Fuse Links

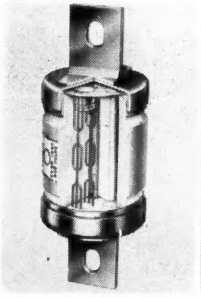
The range of h.r.c. fuses recently introduced by the Brush Electrical Engineering Co., Ltd., Loughborough, covers current ratings of from 2 to 300 A. They employ fuse elements of pure silver surrounded by an inert granular material of controlled size enclosed in a ceramic body of good thermal, mechanical and electrical strength. The elements have one or more calibration sections which volatilize under fault conditions, the resulting arc being absorbed by the surrounding filling and forming a non-conducting section of high breakdown value. High resistance small diameter shunt wires eliminate harmful voltage rise on operation. One of these wires provides visual indication of the healthy or blown condition of the fuse link. End caps are provided with suitable connectors of high conductivity copper, all external current-carrying parts being electro-tinned. These fuses have been fully tested for performance in accordance with B.S. 88 : 1947.

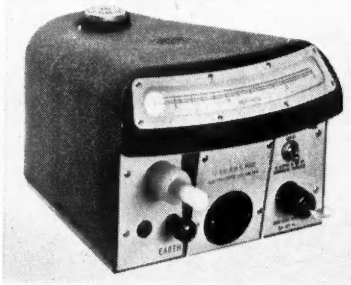
Weatherproof Torches

Two types of rubber covered torch made by Chloride Batteries, Ltd., Exide Works, Clifton Junction, Swinton, Manchester, are primarily intended for use by motorists. These torches are sturdily constructed with metal cases covered in flexible rubber; they have unbreakable lenses and robust twin button "On" and "Off" switches. The batteries, two "Drydex" T20 cells for the smaller torch and three for the larger, are inserted at the base and held in position by a screw type waterproof cap.

The larger model 3RT20, without batteries, costs 13s 8d (including 2s 5d purchase tax in the United Kingdom), while the 2RT20 costs 10s 4d including 1s 10d purchase tax.

Left: **Brush h.r.c. cartridge fuse link.** *Centre:* **"Scalamp" electrostatic voltmeter.** *Right:* **"Drydex" weatherproof torches**





ELECTRICITY SUPPLY

Recent B.E.A. Contracts

Progress of Underground Gasification

DURING the past month the British Electricity Authority has placed contracts for equipment for power stations, transforming stations and transmission lines, amounting in the aggregate to £4,794,244. The principal contracts include the following:—

Cowes power station: Foundations, river works and appurtenant works.—J. Croad, Ltd.

Rye House station, near Hertford: Cables and accessories.—British Insulated Callender's Cables, Ltd.

Tilbury station: L.p. piping equipment.—Stewarts & Lloyds, Ltd.

Castle Donington station, near Derby: Circulating water valves.—J. Blakeborough & Sons, Ltd. Circulating water pumps.—Worthington-Simpson, Ltd.

Bold station, near St. Helens: Circulating water make-up supply mains.—Sir Alfred McAlpine & Son, Ltd.

Ince station, near Ellesmere Port: Four cooling towers.—Film Cooling Towers (1925), Ltd.

Dolgarrog station, Caernarvonshire: 33 kV switchgear.—Ferguson, Pailin, Ltd.

Wakefield station: Main civil engineering works.—Mitchell Construction Co. Six boiler feed pumps.—Mather & Platt, Ltd.

Skelton Grange station, Leeds: H.p. pipework and valves.—Aiton & Co., Ltd.

Stella North station, near Newcastle-upon-Tyne: Ash and dust handling plant.—Babcock & Wilcox, Ltd.

Stella South station: Control building superstructure.—Sir Robert McAlpine & Sons (Newcastle-upon-Tyne), Ltd. Ash and dust handling plant.—Babcock & Wilcox, Ltd.

York station: One 20 MW turbo-generator and feed heating plants.—Brush Electrical Engineering Co., Ltd.

Roosecote station, Barrow: Ash and dust handling plant.—B.V.C. Industrial Constructions, Ltd.

Clyde's Mill station, Glasgow: Auxiliary switchgear.—A. Reyrolle & Co., Ltd.

Daventry substation: 132 kV 2,500 MVA switchgear.—General Electric Co., Ltd.

Clyde's Mill substation, Glasgow: Site and foundation works.—Holst & Co., Ltd.

Slough (New Denham)–Elstree: 275 kV twin 0.4 sq in overhead line.—Watsham's, Ltd.

Stony Stratford–Bedford: 132 kV overhead line.—Watsham's, Ltd.

Keadby–Creyke Beck: 132 kV overhead line.—Riley & Neate, Ltd.

Gas-Electricity Rivalry Urged

Any attempt at co-operation between gas and electricity consultative councils was "entirely illogical and wrong," said Mr. J. Porter, Greenock, at a meeting in Glasgow on 20th November of the South West Scotland Electricity Consultative Council, during consideration of a report of a meeting held with representatives of the gas organization at which the question of service charges was discussed. He said that they were diametrically opposed forces and he felt that the Board was quite justified in this attitude. Progressive organizations benefited by competition. "Some of us carry to this Council the view that we are representing the ratepayers," he added, "but we are here to represent the electricity consumer. The person with an all-electric house is entitled to greater advantages than the person with a house partially equipped with electricity because of the greater consumption." Mr. Porter was opposing a suggestion that a fixed service charge of £10 should be introduced. After Councillor W. Lee, Glasgow, had said it was not a question of rivalry between the Councils but one of economics, it was agreed to accept the report of the conference with the Gas Council.

Position of Overhead Lines

The North Eastern Electricity Board is to supply electricity to Scaling Dam and houses on the main road at Scaling. The County Planning Committee suggested that the overhead lines should run behind the houses, but the Electricity Board, with the support of Loftus U.D.C., proposes to place the lines in front of the premises, so avoiding additional expense should public street lighting be required in future.

Condemned Installations

Complaint was made at Whitworth (near Rochdale) Council that North Western Electricity Board officers had visited houses which had been tenanted for only a comparatively short period and, after inspecting the electrical installations, had condemned them as not being up to standard. This, it was alleged, had been done despite the fact that only a short time before the same installations were passed as satisfactory. The chairman said he understood the objections had something to do with the earthing system and that different schedules were followed with a change of tenancy. The subject was being taken up with the Board, which was making inquiries.

Electricity in Skye

At Portree on 18th November Lady Macdonald, of Armadale Castle, switched on 220 miles of overhead line constructed by the North of Scotland Hydro-Electric Board in Skye. At the opening of an exhibition of electrical appliances held to mark the occasion,

Lord Macdonald, Lord-Lieut. of Inverness-shire, said that work had commenced on a further 85 miles of line and was about to begin on another 81 miles to complete the Storr Lochs scheme. About 1,250 consumers had been connected, and a further 400 would be connected by the end of this year. The total cost of the scheme was £1,250,000. Several new industries had already been started, including a limestone quarry and crushing plant, and an electrically-driven sawmill.

Underground Gasification

Within the next few weeks electricity will be generated for the first time at Newman Spinney, Killamarsh, near Sheffield, by means of low calorific gas supplied by the underground gasification system. The gas for the experiment is being supplied by a burning seam containing about 1,000 tons of coal—sufficient to provide gas for a period of four to five months.

A Ministry of Fuel and Power official stated that if the experiment were successful it was probable that many thin, dirty coal seams in the country—estimated at over 100 million tons—which could not be mined, would be used to provide electricity by this method for the national grid.

Working under very unpleasant conditions the team of thirteen men, under Mr. A. S. Plane, the site superintendent, has been carrying out various experiments to discover the best methods of igniting seams and using the gas obtained. It is understood that within the next year or so sufficient data will have been gathered to enable the Ministry of Fuel and Power and the National Coal Board to put the scheme into practical use.

Proposed Power Station

Derby Estates and Development Committee is recommending the Council to protest against the British Electricity Authority's proposal to erect a power station, with chimneys 425ft high, within a mile of Derby Airport at Burnaston.

Objection to Overhead Lines

The Town Planning and Plans Committee reported to the Stratford-on-Avon Town Council recently its decision to object to the application by the Midlands Electricity Board for permission to erect overhead lines in the parish of Alverston.

Island's Private Power Scheme

The Island of Colonsay, Argyll, is to be given electricity by private enterprise. The scheme, the cost of which is being borne by the owner of the island, Lord Strathcona and Mount Royal, covers three areas—Scalasaig, Glassaird, and Kiloran. Two of the areas have been completed, and it is hoped to complete the third by the end of the year. There are four separate plants, and the scheme has been wired in such a way as to enable it to be connected to the North of Scotland Hydro-Electric Board's system if Colonsay is brought into the Board's supply scheme.

Slurry-Fired Power Station

The erection of a new generating station designed specifically to utilize slurry, a grade of fuel which up till now has had practically no market value, is likely to be put in hand soon at Barony Colliery, Ayrshire. The plan has been approved in principle by the B.E.A. It will be the first attempt to utilize slurry on a big scale without improving the quality by the admixture of higher-grade fuel.

Supply Extension

Northumberland County Planning Committee has approved the construction of a 20 kV overhead line to supply electricity to the village of Blanchland. The l.v. supply system in the village itself will be put underground so as not to spoil the appearance of the village.

Lighting of Walsall Market

To replace the wide variety of lamps which for years have illuminated the open air market at Walsall, the Town Council has arranged for electric lamps in special weatherproof fittings to be provided for all the stalls. The work has been carried out by the Midlands Electricity Board and the supply is being transformed to 100 V to ensure comparative safety.

Ulster Drainage Scheme

The Irish Electricity Supply Board is contributing £750,000 and the Northern Ireland Finance Ministry £340,000 towards a drainage scheme in the Lough Erne district of County Fermanagh. Farm land now subject to heavy flooding will be reclaimed and the new works will ensure a more constant supply of water to the Cliff and Ballyshannon hydro-electric power stations.

Coronation Electricity Tariff

At a meeting of Carlisle Corporation Coronation Committee, notification was received from the North Western Electricity Board that electricity used for any special Coronation purpose would be supplied at a cheaper rate.

Electricity for Pre-war Houses

Electricity is to be installed in 308 pre-war Council houses at Newbury, including those on the Camp Close, Monk's Lane, Skyllings, St. George's Avenue and St. Michael's Road estates.

Thornaby-on-Tees Town Council is considering a scheme for the supply of electricity to about 250 houses in the Northumberland Road area. The cost is estimated at over £10,000.

Hospital Installation

Equipment of New Orthopaedic and Pathological Departments at Norwich

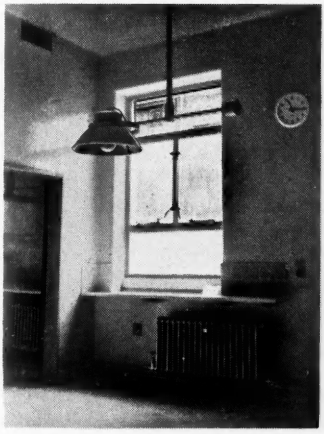
SEVERAL features of electrical interest are to be found in installations recently undertaken at the Norfolk and Norwich Hospital, where new orthopaedic theatres and a pathological department have just been completed. In the former case, new theatres have been erected to replace an out-dated and inadequate theatre unit.

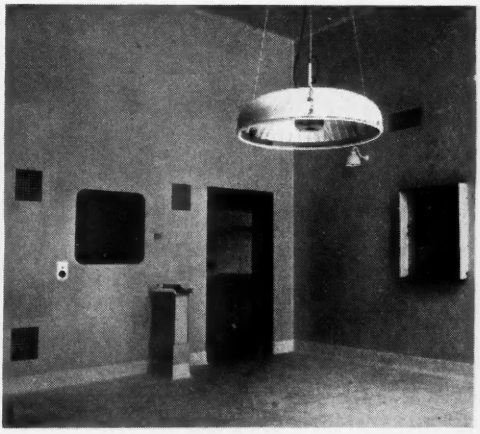
It is mainly to the lighting arrangements that attention is attracted, facilities having to be provided for the special requirements of three operating theatres with adjoining anaesthetic rooms; a dark room for the development of X-ray plates; sterilizing rooms; waiting, dressing and recovery rooms; dressings and stock rooms; and surgeons' and nurses' rooms.

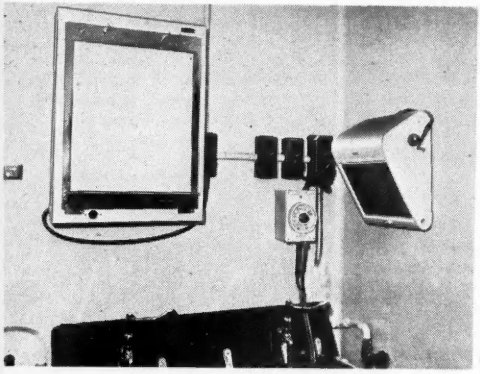
In the main theatre, No. 1, special operating lights have been provided, with a 150 W 24 V centre light for normal use, and three 60 W 50 V lamps for emergency operation on a Tudor system, which also serves certain of the lamps in the anaesthetic rooms. No. 2 theatre is for plaster work, and is similarly equipped to No. 1. No provision is made for emergency lighting in No. 3 theatre, which is smaller than the others, and where the main illumination comes from a 100 W 230 V lamp in a counterpoised pendant fitting. All the theatre lighting equipment was supplied by Technical Lights & Equipment, Ltd.

For the studying of X-ray plates, one illuminated viewing box has been installed in theatres Nos. 1 and 2, each box taking four films. In No. 3 theatre a single viewing box has been fitted. To enable the results of the X-ray examinations to be made rapidly available during operations, plates exposed by means of a portable equipment can be passed directly through a light lock, to a dark room adjoining for developing, and can be available for viewing within three minutes. This developing room is also provided with a viewing box, as well as

Left: **Counterpoise lighting fitting used in No. 3 theatre.** *Right:* **One of the main operating theatres in the orthopaedic block showing special lighting fitting, X-ray viewing box, and light lock for passing X-ray plates to the developing room**







The dark room for developing X-ray plates, showing viewing box, developing lamp and thermostatic control for the developing tank

special green lamps and an electrically heated developing tank, the 600 W elements of which are controlled by a Cambridge temperature regulator. As a precaution against plates being inadvertently exposed to the light of the viewing box, there is a master switch on the lid of the box in which the plates are kept. The Todd Research Engineering Co., Ltd., provided all the dark room equipment, Frederick Thomas & Co., Ltd., supplying all the general lighting equipment required for the department.

A ventilation system comprising ducting with both intake and extract fans (Woods, with Electrical Apparatus Co. "Autoswitches") has been installed by Richard Crittall & Co., Ltd.

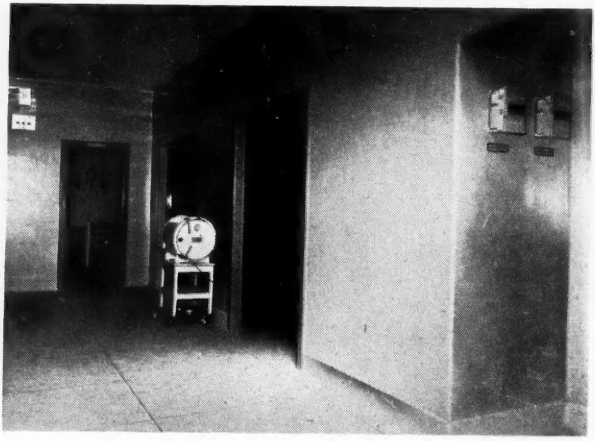
To guard against the risk of explosion, all lighting switches and switch sockets (Wandsworth) are of the mercury break type, where fitted in theatres and anaesthetic rooms. A Julius Sax bell system with visual indicators in the corridor gives warning of any emergency in the theatres, and a Gent master clock in the patients' waiting room controls slave dials throughout the department.

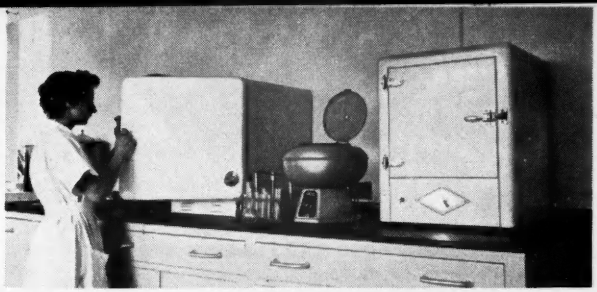
The new pathological department has been constructed on the first floor above the X-ray and outpatients' departments, and comprises separate bacteriology, haematology and biochemistry departments. Here fluorescent lighting, employing Crompton Parkinson fittings, has been adopted for most situations, with Frederick Thomas pendants and wall brackets.

Pathological Department Equipment

Especially generous provision has been made for socket outlets (M.K.) to permit the most convenient use of the multiplicity of electrical appliances, which include Gallenkamp centrifuges and hotplates, Laboratory Thermal Equipment ovens and thermostatic baths, Chas. Hearson & Co.'s incubators, various refrigerators (Electrolux, Kelvinator and Astral), Measuring & Scientific Instruments centrifuges, Unicam absorptiometers, a Hartridge spectrometer, an Egan calorimeter, illuminated microscopes and balances, and sterilizers. Exhaust fans (Woods, with E.A.C. "Autoswitches") are fitted to the fume cupboard and over sterilizers. Drying of test tubes in the wash room is undertaken in cabinets heated by 12in lengths of tubular heaters. A Reliance automatic telephone system

Corridor in the orthopaedic block showing bell indicators, distribution box, ventilating fan controls and portable sterilizer





Right, **Refrigerators and centrifuge in the haematology department**. *Below, right*, **Biochemistry department showing hot-plate, ovens, thermostatic baths and centrifuge**

serves the whole of the department, which also has its own separate Gent master clock installation.

Henley's cables and wires have been employed for the installations in both of the new departments, drawn into heavy gauge screwed steel conduits, with Dorman & Smith distribution boards recessed in the walls near the ceilings to serve the various sections.

The Eastern Electricity Board, Norwich District (district manager, Mr. R. E. Atkins, A.M.I.E.E.) carried out the electrical installation in the orthopaedic block, while A. Pank & Son, Ltd., undertook the scheme for the pathological department; Mr. G. T. Redgment, A.M.I.E.E., M.Cons.E., acting as consulting engineer for both contracts. The architects were Edward Boardman & Son.

Progress Towards the Petrol-Electric Car

AN account is given in the *Electro Magazine* for September-October of a new prototype developed by the Compagnie Normande d'Etude. It is called the "Symetric-Paris," and has neither gearbox nor clutch. An i.c. engine drives a generator, which supplies power to four electric motors which comprise the hubs of the vehicle wheels. Acceleration and braking are carried out by varying the pressure on a single pedal.

The speed of the vehicle is altered by continuous and automatic change in the power supplied by the i.c. engine to the generator and thus to the motors in the wheels. The system used makes it unnecessary to vary the excitation of the generator.

The rear wheels are provided with conventional brakes for use when the vehicle is stationary. When it is in motion, releasing pressure on the single control pedal reverses the direction of current flow and causes weak or powerful braking according to the speed at which pressure on the pedal is released. Details of the method of current reversal are not given.

A number of experiments showed that the drive was distributed evenly between all four wheels. When no drive was being exerted through one wheel, e.g., when the wheel was held off the ground on a small wheeled trolley, the car manœuvred perfectly both forward and in reverse. When the car was raised off the ground and all four wheels were driven slowly, one wheel could be stopped by slight pressure of the foot against the tyre, and the other three then revolved faster.

During tests the highest voltage registered was 150 V while the maximum reading on the ammeter, which was attained during braking, was 200 A. Starting is by a 12 V battery, which is used to drive the generator, as a motor, for starting the i.c. engine. The maximum generator output is 22 kW.

BREWERS' EXHIBITION

A Review of New Electrical Equipment

SO much electrically operated equipment was displayed last week at the biennial Brewers' and Allied Traders' Exhibition at Olympia, London, that we shall have to confine our comments mainly to new apparatus. Modern methods of grain preparation were demonstrated by scale models of complete grain drying, handling and storage units on Aldersley Engineers' stand, and by a model of a malting plant shown by Thomas Robinson & Son, Ltd. An improved barley dressing machine made by George Porteus & Sons (Leeds), Ltd., gives five distinct separations, incorporating head and tail aspiration, rapping and a reciprocating circular brush motion for sieve cleaning.

A new 42-head beer filling machine made by H. Pontifex & Sons, Ltd., in which air from each bottle passes direct to atmosphere, incorporates positive mechanically-operated bottle lifts, "Airflex" clutch and automatic cut-outs. Two new Barnett & Foster fully automatic syruping, filling and crowning units were on view, with 12 and 8 head fillers, other units of this type being shown by George S. Clayton, Ltd. (36 head) and Rylands Engineering Co., Ltd. (12 head).

The combined British Syphon Co. and Riley Manufacturing Co.'s exhibit included the latter's new automatic 12 head syruping, filling and crowning machine. A new filler and crowner formed part of the G. J. Worssam & Son's display, and the 1953 models of the "Aluseal" and "Sealomatic" capsuling machines made their first appearance on the Ideal Capsules' stand. R. W. Webster & Co.'s new 6-head version of the "Regal" crown corking machine has variable speed drive arranged for outputs of 200–600 dozen per hour. The J. W. Flower & Co. (Engineers) "Eclipse" improved single body labelling machine is fitted with a label dating attachment and Rawsons' precision labeller handles articles from miniature bottles to pints at speeds up to 60 per minute.

The automatic loading machanism has been completely redesigned on the "Bratby-Gem" soaker-rinser bottle cleaner. A new British Miller Hydro bottle washer has an exceptionally large capacity despite the small floor area occupied, while the G. Hopkins & Sons' new "Highbury" super-hydro bottle washer for all sizes of bottles has fully automatic feed and discharge gear for outputs of 250–1,200 dozen per hour. A power-operated rinser for new bottles was shown for the first time by Thomas Hill Engineering Co. (Hull), Ltd. With bottle washing machines Dawson Bros., Ltd., introduced the "Deluge Minor" dish-washing machine which can cope with the crockery from fifty meals per hour.

A new model of the Hoover "Glass-master" glass washer, which deals with all types of glasses from a liqueur glass to a pint tankard at a rate of up to 1,500 per hour, incorporates many new features. Other types of automatic glass washer were shown by the Moreton Engineering Co., Ltd., and Gaskell & Chambers, Ltd., on whose stand could also be seen "Prest-cold" refrigeration equipment comprising bottle cooling trays, an icemaker, a cellar cooler and a cask cooler. Other examples of bottle cooling equipment, wine cooling cabinets, service cabinets and beer cooling equipment, etc., were displayed by Frigidaire, J. & E. Hall, Ltd., L. Sterne & Co., Ltd., and the U.D. Engineering Co., Ltd.

Among new mechanical handling equipment were Teleflex conveyors with recently developed remote control apparatus and the British Wedge Wire Co.'s "Wedco" twin track lift which requires very little floor space and elevates approximately 720 loads per hour with automatic feed and discharger.

Indian Railways Exhibition

AN exhibition to celebrate the centenary of the first Indian railway is to be held in New Delhi from 28th February to 17th April. Its scope will include electric traction equipment, switchgear and lighting equipment for railways, ventilation and pumping plant, welding apparatus, and signal and cable equipment. Inquiries should be addressed to the Secretary, Indian Railways Centenary Exhibition Committee, Railway Board, New Delhi.

Electrical Power Engineers

Preserving Political Independence

THE twenty-fifth annual dinner given to the National Executive Council of the Electrical Power Engineers' Association by its South-Eastern Division took place on 28th November at the Connaught Rooms, London, W.C.2. The chairman of the Division, Mr. J. J. Bradley, presided over a gathering of about 400, for which the hon. secretary, Mr. F. H. Smethurst, had once more made the arrangements.

Minister's Tribute

Proposing the toast of "The Association," the Minister of Fuel and Power (Mr. Geoffrey Lloyd) referred appreciatively to the value to the country of the high code of professional conduct of its members. His own actions as Minister were based on the principle that nationalized undertakings must be run for the benefit of the community, quite irrespective of party politics. He was glad to have appointed Lord Citrine for a further term of office because he was doing a very good job.

Response was made by the E.P.E.A. president, Mr. J. L. Moss, who said that the reappointment of Lord Citrine was popular with members of the Association. They looked forward to increasing prosperity of the electricity supply industry under his guidance. The E.P.E.A. was keenly aware of its responsibilities regarding education, as the future of the industry depended upon the type of recruits it attracted. Junior engineers should feel that the highest offices in the industry were open to them.

Technical knowledge (which could be taken for granted) was not enough to produce leaders. It was as important to understand men and functions of management and to be able to make decisions. This implied an extension of their interests beyond engineering. The Association's non-political complexion was a great source of strength and gave it freedom to criticize any party. Scottish members would dislike severance of their undertakings from the main body.

Sir John Dalton (director, Cable Makers' Association) proposed "The Electricity Supply Industry," which he said was part of an industry employing 850,000 people. He suggested that the shortage of plant had been "oversold" to the public with adverse effects. The supply of domestic appliances had been curtailed with the idea of "playing the game" but gas competitors were taking advantage of the situation to engage in various forms of active propaganda. The time had come for the electrical industry to go all out for the domestic load. There could be no doubt that women especially wanted it.

Unnecessary Restrictions

Responding, Mr. H. J. Randall (chairman, London Electricity Board) spoke of the sense of frustration felt by those in the industry whose keenness to meet an ever-growing demand of the public (the acid test of the value of their work) was hampered by unnecessary restrictions. He fully agreed with previous speakers about the value of independence from party politics.

Those engaged in the supply industry, whatever their political opinions, had loyally accepted the changes brought about by the 1947 Act. He expressed appreciation of the help given by the Minister, both in and out of Parliament, and welcomed his defence of the London Board in regard to the floodlighting of buildings. In a reference to the managerial abilities of members of the Association on the staff of the London Electricity Board, he paid a tribute to the work of the E.P.E.A. president.

The formal speeches were followed by a presentation by the president of a cheque to Mr. J. F. Wallace, general secretary, who is retiring at the end of this year after 31 years' service with the Association. In returning thanks Mr. Wallace mentioned the high qualifications for the position possessed by his successor, Mr. H. Norton (now his deputy). The evening ended with dancing to Tommy de Rosa's orchestra.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

Cable & Wireless (Holding), Ltd., announces that, under the scheme dated 17th October, 1952, holders of £3,240,080, or over 89 per cent of the 3 per cent 3½-year unsecured loan stock, have elected to convert into the new 5 per cent debenture stock 1972/77. This leaves only £332,582 of the new stock to meet over 1,500 cash applications for a total of over £2,850,000. Cash applications for £100 of new stock or less will be accepted in full, the remaining applications being scaled down with the largest receiving approximately 7 per cent. To meet conversion applications by the holders of the 4 per cent 10-year unsecured loan stock a further £1,721,852 (over 86 per cent of the possible maximum) of the new stock will be issued, making the total outstanding amount of new stock £5,354,514. The balance of 4 per cent loan stock remaining outstanding is £2,278,148.

Vactric, Ltd., reports a group net trading profit of £129,072 for the year ended 29th March, as compared with £243,149 in the preceding year, after meeting Treasury loan interest £16,675, and depreciation £50,576. Taxation requires £54,651, and £18,000 is transferred to loans repayment reserve. A balance of £55,061 is added to the carry-forward, making £153,321. As already announced no dividends are being paid on the preference and ordinary capital.

Brook Motors, Ltd., reports a group profit for the year to 30th September last of £682,950, as compared with £480,380 for the preceding year. A sum of £439,459 is set aside for taxation, and it is proposed to pay a final dividend of 15 per cent, making 20 per cent for the year (unchanged).

Aerialite, Ltd., reports a net profit for the year ended 31st May last, after providing for taxation, of £68,211, as compared with £67,548 for 1950-51. The final dividend is 55 per cent, again making 88⅓ per cent for the year. The balance carried forward is £130,695 (against £107,668 brought in).

Heenan & Froude, Ltd.—In his statement which accompanies the report and accounts, Mr. A. P. Good (chairman) says that the balance of orders on the books at the close of the year was well in excess of £5,000,000, but with the growing competition from other industrial nations, the resistance of overseas buyers to price increases, and the readiness of foreign manufacturers to give quick delivery and often lower prices, a continuance of the upward trend in costs at home will soon be reflected in smaller order books. All sections of the company's business have been fully employed, and the range of machines has been added to. Mr. Good's statement concludes with a review of the progress made by the subsidiary companies in the group.

International Combustion (Holdings), Ltd., has received Treasury consent to the capitalization of £959,245 of reserves for a scrip bonus of one 5s share for every 5s ordinary unit held. The new stock will rank for dividend declared after the date of issue.

Murex, Ltd., has now announced the terms for the issue of 200,000 £1 ordinary shares. These will be offered to ordinary stockholders at 48s a share on a one-for-ten basis. They will not participate in the interim dividend to be declared in respect of the year ending 30th April next.

Telephone Rentals, Ltd., is making an issue of 880,000 5s ordinary shares at 6s per share, which are being offered to shareholders in the proportion of one new share for every five held.

Belliss & Morcom, Ltd., have declared an interim dividend of 4 per cent (unchanged).

The London Electrical & General Trust, Ltd., is paying an interim dividend of 3 per cent (against 2½ per cent).

Lisbon Electric Tramways, Ltd., is paying an interim dividend of 2½ per cent, tax free (unchanged).

Hick, Hargreaves & Co., Ltd., have declared an interim dividend of 5 per cent (same).

Johnson, Matthey & Co., Ltd., are paying an unchanged interim dividend of 3 per cent.

The Oriental Telephone & Electric Co., Ltd., has declared an interim dividend of 4 per cent (unchanged).

Telephone Rentals, Ltd., is again paying an interim dividend of 4 per cent.

New Companies

Cables & Conductors, Ltd.—Registered 31st October. Capital £1,000. To acquire patent rights and brevets d'invention, and to carry on the business of manufacturers of and dealers in electrical appliances, etc. B. Zucker is permanent managing director and chairman. Regd. office: Broadmead House, 21, Panton Street, S.W.1.

J. B. Martin (Redruth), Ltd.—Registered 9th October. Capital £1,000. Service engineers, factors and dealers in electrical and automobile equipment and accessories, etc. Directors: J. B. Martin and P. R. Giblett. Secretary: P. R. Giblett. Regd. office: Treruffe Hill, Redruth.

Colosseum General Electrical (Holloway), Ltd.—Registered 20th October. Capital £100. Electricians, mechanical engineers, etc. Solicitors: Glover & Co., 115, Park Street, W.1.

Walker & Smith (Electricians), Ltd.—Registered in Edinburgh 6th November. Capital £9,000. Electricians, etc. Directors: G. S. Walker and G. S. Smith. Regd. office: 25, East Church Street, Buckie.

Winding-up Petition

Accessories Electrical Supplies (Wholesale), Ltd.—A petition for the winding-up of this company has been presented to the High Court by Mr. R. A. Raphael, electrical wholesaler, and will be heard in London on 15th December. Any person who intends to appear on the hearing of the petition should notify Messrs. Tringhams, 53, Doughty Street, John Street, W.C.1, solicitors for the petitioner, by 13th December.

Bankruptcies

S. I. Chapman, carrying on business under the name of S. Chapman & Co., at 103, Endsleigh Court, W.C., electrical agent.—First meeting held 3rd December. Public examination 22nd January at Bankruptcy Buildings, Carey Street, London, W.C.2.

A. R. Williams, formerly carrying on business at 33a, Beech Road, Birkenhead, electrical engineer.—First meeting held 3rd December. Public examination 21st January at the Court House, Pilgrim Street, Birkenhead.

R. A. Squires, carrying on business as Radiotois, at 21, Station Road, Brixton, S.W.9, radio engineer and dealer in electrical and radio goods.—Application for discharge to be heard on 20th January at Bankruptcy Buildings, Carey Street, London, W.C.2.

J. S. Anderson, trading as "Electronic Services," at Nearavon, Salisbury Street, Fordingbridge, Hants, radio and electrical engineer.—Last day for receiving proofs for dividend 9th December. Trustee, Mr. A. H. Brown, The Square, Fordingbridge, Hants.

C. L. Philpott, 55, High Street, Walton-on-Naze, Essex, radio and electrical dealer.—Last day for receiving proofs for dividend 11th December. Trustee, Mr. A. W. Hunter, Latham & Co., Walter House, 418-422, Strand, London, W.C.2.

A. Sheridan, lately trading in partnership with another as S.M. Disposals, 223, Richmond Road, Hackney, London, E.8, radio and electrical contractor.—Trustee, Mr. L. C. Curtis, 15, Great Marlborough Street, London, W.1, appointed 19th November.

H. Walton, carrying on business with another as "Universal Motor Repair Co.," at 200, Birchfield Road, Perry Barr, Birmingham, 19, electrical engineer.—Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver, released 18th November, 1952.

A. Fielder, carrying on business at 314, Shortheath Road, Erdington, Birmingham, and at 4, Cooksey Lane, Birmingham, under the style of A. Fielder & Co., radio and electrical retailer.—Last day for receiving proofs for dividend 13th December. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

S. E. Jones and **G. W. A. E. Short,** carrying on business at Elsecar, near Barnsley, under the style of "S. E. Jones & Co.," as dry battery manufacturers.—Supplemental dividend of 18s 6d in the £, payable on and after 5th December at the Official Receiver's office, 55, Queen Street, Sheffield, 1.

B. A. Murton, 54, The Green, Writtle, Essex, electrician.—First and final dividend of 1s 1½d in the £, payable on and after 12th December at the Official Receiver's office, 3, Central Buildings, Matthew Parker Street, Westminster, S.W.1.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 12th December:

ANCOLITE. No. 710,735. Class 7. Electricity generators.—Allied National Corporation, Ltd., Anco House, Buckingham Gate, London, S.W.1.

SPEEDMASTER. No. B699,639. Class 9. Electrical frequency convertors.—Laurence, Scott & Electromotors, Ltd., Gothic Works, Hardy Road, Norwich, Norfolk.

COLLECTRON. No. 709,337, Class 9. Electrostatic dust precipitation and collection apparatus.—Collectron (Pty.), Ltd., Johannesburg, South Africa. Address for service, c/o Forrester, Ketley & Co., Jessel Chambers, 88–90, Chancery Lane, London, W.C.2.

ERODOMATIC. No. 710,858, Class 9. Electrical apparatus included in Class 9 for use in the working of metals.—Wickman, Ltd., Banner Lane, Tile Hill, Coventry.

KELVIN. No. B702,254, Class 11. Lamps for lighting purposes.—Kelvin & Hughes, Ltd., Kelvin Works, Kelvin Avenue, Hillington, Glasgow.

FLAME THROWER. No. B709,239, Class 11. Vehicle electric lamps.—Joseph Lucas, Ltd., Great King Street, Birmingham, 19.

STOCKS and SHARES

A DECIDED turn for the better in the industrial markets of the Stock Exchange coincided with the opening of the Commonwealth Conference about a week ago. Gilt-edged securities have also been harder, but industrial shares took over the lead for the first time in many weeks. Evidence of new confidence comes from the ready manner in which new issues of shares are being taken up. Murex ordinary have advanced half-a-crown to 55s 6d since news of the coming offer of new shares at 48s. Until very recently, an announcement of this sort had an almost automatically depressing effect on the market. Most of the leading electrical equipment shares are noticeably better on the week, A.E.I., for instance, being 2s 3d to the good. Others which have shown up particularly well include Tube Investments, Lucas, London Electric Wire, Metal Industries, and Babcock & Wilcox, while the radio group has again been prominent.

Cable & Wireless Debentures

Nearly 90 per cent of the Cable & Wireless (Holding) loan stockholders concerned accepted the company's offer of conversion into the new 5 per cent debenture stock, redeemable 1972–77. Dealings are taking place in the latter at about 101¼. The issue involves a total of well over £5 million of stock and is welcomed in the market as being likely to relieve the dearth of well-secured redeemable debenture stocks which offer the buyer something near 5 per cent on his money. From the point of view of yield, comparison is made with the recently-issued 4 per cent British Transport stock, which has the same redemption dates as the debenture, and gives a return of under 4¼ per cent at the present price of 95¾. Apart from the difference in security, the comparison is modified, of course, by the advantage of a price below par in the case of the gilt-edged stock. The debenture stock is currently transferable in allotment letter form, and therefore free of the 2 per cent stamp duty for the present.

Recent Dividends

Scottish Cables 4s shares have retained the rise to 11s 3d which followed the declaration, a fortnight ago, of a 7½ per cent interim dividend for the year ending next April. Last year's corresponding payment was 10 per cent, followed by a final of 22 per cent, but these applied to only half the present capital, which was subsequently doubled (to £583,000) by a share bonus. In effect, the latest payment represents an increase of 2½ per cent in the rate. Whether this implies any change in the total for the year will, naturally, not be known until the final dividend is announced about June next year. On the basis of last year's total distribution, the yield on the shares is close on 5¾ per cent, which seems to imply cautious hopes on the point. Aerialite 1s shares were quoted at 8s 3d ex the final dividend, which again made a total of 88⅓ per cent for the full year. The complete accounts confirm a further rise in the trading profit from £182,000 to £198,000.

Brook Motors

This company, which was made public early in 1950, is maintaining the dividend for the year ended in September at a total of 20 per cent, and reported recently a further substantial expansion of earnings which puts the distribution well inside the conservative class. Group profits increased by more than £200,000, to £683,000. After providing for taxation there remains a surplus of £244,000, of which preference and ordinary dividends will together take little more than £50,000 net. The price of the 10s shares was initially marked down to 28s, the lowest of the year, apparently on disappointment with the unchanged dividend, but has recovered, to 28s 3d ex-dividend, on consideration of the figures. The yield on the 10s shares, which were quoted up to 38s 6d last year, is now £7 1s 7d per cent.

New Issues

The new 5s deferred shares offered by Pye, Ltd., to existing holders, in the proportion of one new share for every three held, opened this week at a premium of 4s on the issue price of 12s. With this offer, shareholders also received allotment letters for a free bonus issue of shares in the proportion of one for eighteen. The old deferred shares were quoted at 15s 9d ex-rights to both offers. Thorn Electrical Industries are raising new money by an issue to preference and ordinary shareholders of £500,000 5½ per cent loan stock 1959/64 at par.

Dewhurst Results

The final dividend declared last week by Dewhurst & Partner makes a total of 19 per cent for the year on the ordinary capital of £180,000. Distributions for the previous year, during which a 200 per cent share bonus intervened between the interim and final payments, were equivalent to a fraction under 16 per cent on the present amount of capital. Made public in 1948, the company has recorded an expansion of earnings in each successive year. The preliminary profits statement accompanying the dividend news shows that progress was vigorously maintained in the latest period, the net profit being up by some 25 per cent at £52,000, despite a £35,000 increase in the tax provision. At 5s cum dividend the 2s ordinary shares now show a return of 7⅝ per cent on the money, and stand at about the best price of the year.

ELECTRICAL INVESTMENTS

Past Week's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 1st Dec. 1952	Week's Rise or Fall	Est. Yield £	Est. Yield s	Est. Yield d
Gilt-edged and Overseas Stocks							
Brit. Elec. 1968/73	3	3	85	+½	3	10	7
Brit. Elec. 1974/77	3	3	83½	—	3	11	10
Brit. Elec. 1976/79	3½	3½	89½	+½	3	18	3
Brit. Elec. 1974/79	—	4½	100	—	4	5	8
Calcutta Elec. ..	6†	6†	20/-	—6d	6	0	0†
East African Power	7	7	22/-	—1/-	6	7	3
Nigerian Elec. ..	10	10	21/3	—		—	
Palestine Elec. "A"	5†	Nil	11/-	—6d		—	
Perak Hydro-Elec.	Nil	Nil	14/-	—1/-		Nil	
Equipment and Manufacturing							
AberdareCables(5/-)	20	20	14/6	+6d	6	18	0
Aerialite (1/-) ..	83½	88½	8/3xd	—	10	14	3
Allen, W. H. ..	15	15	41/9	—		—	
Aron Elec. Ord. ..	15	15	33/9	—	8	17	9
Assoc. Elec. Ord...	20	20	75/-	+⅛	5	6	8
Automatic Tel.& El.	15	15	57/6	—	5	4	2
Babcock & Wilcox	18	18	71/-	+3/-	5	1	1
Baldwin, H. J. (2/-)	25	20	3/6	—	11	8	9
Bakelite (10/-) ..	—	—	17/-	—6d		—	
British Aluminium	10	12	43/9	+6d	5	9	7
B.I. Callender's ..	7½	9	33/-	—	5	9	1
British Thermostat (5/-)	30	30	27/-	—	5	11	1
British Vac.Cleaner (5/-)	25	25	13/-	—	9	12	4
Brook Motors(10/-)	20	20	28/3xd	—	7	1	7
Brush Ord. (5/-) ..	10	10	5/-	—	10	0	0
A. F. Bulgin (1/-)..	27½	30	2/7½	+1½d	11	8	6
Burco (5/-) ..	38½	35	19/6	—	8	19	6
Chloride El. Storage	15	15	61/3	—	4	18	0
Cole, E. K. (5/-) ..	25	25•	17/-	+9d	7	7	1
Cossor, A. C. (5/-)	Nil	10	10/-	—3d	5	0	0
Crabtree (10/-) ..	17½	17½	31/3	—⅛	5	12	0
Crompton Parkinson Ord. (5/-) ..	11¼	11¼	9/-	—	6	5	0
De La Rue (5/-) ..	50	35•	8/3]	—6d		—	
Decca (1/-) ..	112½	112½	19/-	+1/9	5	18	6
Dewhurst (2/-) ..	22½	19	5/-	—	5	12	0
Dictograph Tel.(2/-)	20	20	5/-	—	8	0	0
E.M.I. (10/-) ..	12	12	15/-	—	8	0	0
Electrical Components (5/-) ..	20	20	10/-	—	10	0	0
Elec. Construction	15	15	50/-	—	6	0	0
Enfield Cable Ord.	7½	7½	21/6xd	—	6	19	6
English Electric ..	15	15	55/6	—	5	8	1
Ericsson Tel. (5/-)	22†	22•†	39/-	—	2	16	5†
Ever Ready (5/-)	35	35	26/-	—	6	14	8
Falk Stadelmann	15	15	38/9	—	7	14	8
G.E.C. Ord. ..	22½	22½	42/6	—	5	6	0•
General Cables (5/-)	30	30	14/6	—	10	6	10
Greenwood & Batley	15	15	38/-	—	7	18	0
Hackbridge Cable (5/-)	20	20	10/3	—6d	9	15	0
Hackbridge Hewittic (5/-)	18	20	16/3xd	—	6	3	0
Hall Tel. Acc. (10/-)	10	10	10/6	—	9	10	6
Heatrae (2/-) ..	12½	12½	4/-	—	6	5	0
Henleys (5/-) ..	20	20	18/6	+6d	5	8	0
Holophane (5/-) ..	15	20•	11/3	—	8	17	10
Hoover (5/-) ..	37½	35•	23/9	—	7	7	4

Company	Dividend Previous	Dividend Last	Middle Price 1st Dec. 1952	Week's Rise or Fall	Est. Yield £	Est. Yield s	Est. Yield d
Equipment and Manufacturing (continued)							
Intl. Combustion (5/-)	20	25	24/6	+3d	5	2	1
Johnson & Phillips	15	15	52/-xd	—	5	15	5
Lancashire Dynamo	22½	12½•	42/6	—	5	17	8
Laurence,Scott(5/-)	12½	15	13/3	—	5	13	3
London Elec. Wire	12½	12½	51/3	+1/9	4	17	6
J. Lucas	7½	9½	36/3	+1/9	5	1	3
Marryat & S. (2/-)	22½	22½	5/-	—	9	0	0
Mather & Platt ..	12½	12½	42/6	+6d	5	17	9
Metal Industries ..	10	15	41/3	+1/9	7	5	8
Mid. Elec. Mfg. ..	15	15	53/9	—	5	11	6
Murex	12½	15	55/6	+½	5	8	0
Newman Ind. (2/-)	6	10	2/3	—	8	17	10
Oldham & Son (1/-)	30	35	2/6	—		—	
Parnall (Yate) (5/-)	6	6	4/-	—3d	7	10	0
Parsons, C. A. ..	15	10•	53/9	—		—	
Plessey (5/-) ..	22½	25	19/9xd	—	6	6	6
Pye Deferred (5/-)	18	18	15/9xr	—		—	
Revo (10/-) ..	27½	27½	42/6xd	—	6	9	6
Reyrolle	15	10•	48/9	+⅛		—	
Scot. Cable (4/-) ..	30	32	11/3	—		—	
Siemens Ord. ..	10	10	34/-	—	5	17	8
Strand Elec. (5/-)	17½	17½	8/9	—	10	0	0
Sturtevant (5/-) ..	16½†	17¼•†	22/6	—		—	
Switchgear&Cowans (5/-)	22½	22½	15/-	+1/-	7	10	0
Taylor T. (5/-) ..	20	20	19/3	—9d	5	4	0
T.C.C. (10/-) ..	20	20•	37/6	—		—	
T.C. & M... ..	10	10	25/6	—		—	
TelephoneMfg.(5/-)	10	10	8/-xd	—		—	
Thorn Elec. (5/-)..	10	12½	8/-	—	7	10	3
Tube Investments	25	15•	58/9	+3/-	5	2	3
Vactric (5/-) ..	Nil	Nil	5/-	—		Nil	
Veritys (5/-) ..	Nil	7½	4/9	—	7	18	0
Walsall Conduits (4/-)	70	70	46/-	+6d		—	
Ward & Goldstone (5/-)	45	45•	30/9	—		—	
Watford (2/-) ..	25	25	6/3	+3d	8	0	0
Westinghouse Brake	14	14	50/-	—	5	12	0
West, Allen (5/-) ..	12½	15	10/3	—	7	6	4
Trusts, Transport and Communications							
Anglo-Am. Tel.: A Ord.	—	6	79½	—	7	11	0
Ord.	—	3¾	55	—	6	16	3
Anglo-Portuguese	8	8	20/6	—	7	16	1
Brit.Elec.Traction: Def. Ord. ..	22½	25	425	—	5	17	8
Cable & Wireless: Ord.	6	8	123½	+1	6	9	7
4% Loan ..	4	4	98½	—	4	1	3
Calcutta Trams ..	6†	6†	21/-	+6d	5	14	3†
Cape Elec. Trams	5	5½	10/-	—	11	0	0
Marconi Marine ..	10	10	30/6	—	6	11	3
Oriental Tel. Ord.	16	16	57/6	—		—	
Telephone Props.	8	8	35/-	+⅛	4	11	5
Tele. Rentals (5/-)	10	10	8/6	—	5	17	9

* After capital bonus.
† Dividends are paid free of Income Tax.

NEXT WEEK'S EVENTS

Monday, 8th December

BIRMINGHAM.—Imperial Hotel, 6 p.m. I.E.E. South Midland Supply and Utilization Group. "Transients in Electric Mine Winders and their Effects on Rope Stresses," by T. H. Petch.

BRISTOL.—S.W.E.B. Offices, Colston Avenue, 6 p.m. I.E.E. Western Centre. "Domestic Electrical Installations: Some Safety Aspects," by H. W. Swann.

CHESTER.—Town Hall, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "The Electrolytic Analogue in the Design of High-Voltage Power Transformers," by D. McDonald. "The Accurate Mapping of Electric Fields with an Electrolytic Tank," by Dr. K. F. Sander and J. G. Yates.

KINGSBURY.—Prince of Wales Hotel, 8 p.m. A.S.E.E. North-West London Branch. "The Maintenance of Electric Lifts."

LEEDS.—Lighting Service Bureau, 24, Aire Street, 6.15 p.m. I.E.S. Leeds Centre. Student members' night.

LIVERPOOL.—Radiant House, Bold Street, 6.30 p.m. Institution of Heating and Ventilating Engineers, Liverpool & District Branch. "The Dual Function of Ventilation and the Meaning of Air Conditioning," by A. L. Longworth.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. Institution of Electrical Engineers. Informal meeting. Discussion on "The Maintenance of Electrical Equipment," opened by R. H. Cobbold.

St. Ermin's Hotel, Caxton Street, 6.45 p.m. A.S.E.E. Central London Branch. "Fluid Couplings for Electric Motor Drives," by E. C. Farrer.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Inhibited Transformer Oil," by W. R. Stoker and C. N. Thompson. "The Stability of Oil in Transformers," by P. W. L. Gossling and L. H. Welch.

NOTTINGHAM.—Albert Hall, 6.30 p.m. I.E.E. East Midland Centre. Faraday Lecture. "Light from the Dark Ages or the Evolution of Electricity Supply," by A. R. Cooper.

SHEFFIELD.—The University, Western Bank, 6.30 p.m. I.E.S. Sheffield Centre. "Lighting in Crime Detection," by C. H. Edlin.

Liversey Clegg House, 7.30 p.m. Junior Institution of Engineers, Sheffield and District Section. "The Application of Automatic Control," by A. Muir.

STOKE-ON-TRENT.—Electricity Showrooms, 7 p.m. I.E.E. North Staffordshire Sub-Centre. "The Economics of Low-Voltage Electricity Supplies to New Housing Estates," by F. G. Copland.

Monday, 8th December, to Friday, 12th December

LONDON.—Earls Court. Smithfield Show and Agricultural Machinery Exhibition.

Tuesday, 9th December

BELFAST.—Presbyterian Hostel, Howard Street, 6.45 p.m. I.E.E. Northern Ireland Centre. "Economic Plant Sizes and Boiler-Set Groupings on the British Grid," by B. Donkin and P. H. Margen.

BOLTON.—Balmoral Hotel, Bradshawgate, 7.30 p.m. A.S.E.E. Bolton Branch. "H.r.c. Fusegear," by E. Jacks.

CAMBRIDGE.—Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. "Television Camera Tubes," by Dr. R. Theile.

GLASGOW.—Engineering Centre, 351, Sauchiehall Street, 7 p.m. Incorporated Plant Engineers, Glasgow Branch. "Power Factor Correction," by H. Ferguson.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Post-Graduate Activities in Electrical Engineering," by W. J. Gibbs, D. Edmundson, R. G. A. Dimmick and G. S. C. Lucas.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements and Supply Sections. "Voltage Transformers and Current Transformers Associated with Switchgear," by W. Gray and A. Wright.

Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6 p.m. Illuminating Engineering Society. "Visual Fatigue," by H. C. Weston.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "275 kV Developments on the British Grid System," by D. P. Sayers, Dr. J. S. Forrest and F. J. Lane.

PRESTON.—Starkie House, Starkie Street, 7.30 p.m. Institution of Works Managers, Preston Branch. "The Role of Trades Unionism in Modern Industry," by A. E. Ford.

READING.—George Hotel, 7 p.m. I.E.E. London Students' Section. District meeting. Chairman's Address. "The Protection of Running Buses," by B. L. A. Ellings.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre Students' Section. "A 2 MV Impulse Generator," by J. A. S. Hilditch.

STOKE-ON-TRENT.—M.E.B., 31, Kingsway, 6 p.m. I.E.S. Stoke-on-Trent Group. "Colour in Industry," by J. H. Nelson.

Wednesday, 10th December

ABERDEEN.—Caledonian Hotel, 7.30 p.m. I.E.E. North Scotland Sub-Centre. "A Logical Approach to the Problems of Electric Space-Warming," by D. H. Parry.

BILSTON.—At Stewarts & Lloyds, 7 p.m. Junior Institution of Engineers, Midland Section. "High Frequency Induction Heating," by H. Knight.

BIRMINGHAM.—James Watt Institute, 6.45 p.m. I.E.E. South Midland Students' Section. "Testing of Turbo-Alternators," by J. P. Harbord.

BRADFORD.—Midland Hotel, 7.30 p.m. A.S.E.E. Bradford Branch. "Miniature Circuit Breakers."

LEEDS.—Lecture Hall, City Museum, 7.30 p.m. A.S.E.E. Leeds Branch. "Radioactive Isotopes in the Service of Medicine," by Dr. F. W. Spiers.

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "The B.B.C. School, Evesham" and "The Post Office School, Stone," opened by Dr. K. R. Sturley and H. R. Harbottle.

I.E.E. London Students' Section. 2.30 p.m. Visit to Firestone Tyre and Rubber Co., Ltd., Brentford.

London School of Hygiene and Tropical Medicine, Keppel Street, 6.30 p.m. British Institution of Radio Engineers, London Section. "The Production of Television Receivers," by F. Allen.

NEWCASTLE-UPON-TYNE.—Neville Hall, Westgate Road, 6 p.m. British Institution of Radio Engineers, North Eastern Section. "The Development of the Radio and Electronics Industry in India," by G. D. Clifford.

NOTTINGHAM.—Welbeck Hotel, 7 p.m. Incorporated Plant Engineers, East Midlands Branch. "The Diesel Electric Locomotive," by F. D. Lester.

PRESTON.—Harris Institute, Corporation Street, 7 p.m. I.E.E. North Lancashire Sub-Centre. "The Protection of Electrical Power Systems—A Critical Review of Present Day Practice and Recent Progress," by H. Leyburn and C. H. W. Lackey.

Bull & Royal Hotel, 7.45 p.m. A.S.E.E. Preston Branch. "Pyrotenax Cables," by R. B. Barritt.

WEYMOUTH.—South Dorset Technical College, 6.30 p.m. I.E.E. Southern Centre. District meeting. "Principles of Colour Television," by Dr. J. H. Mole.

WORTHING.—Assembly Hall. E.C.A. Worthing and District Branch. Annual dinner and dance, on behalf of the E.I.B.A.

(Continued at foot of page 1253)

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 14th January from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1944

8398. Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—Electric facsimile communication systems. 3rd May, 1944. (685989.)

1945

23171. Standard Telephones & Cables, Ltd.—Radio direction-finding system. 7th September, 1945. (685990.)

1947

9688. Philips Lamps, Ltd.—Electric arc welding. 11th April, 1947. (685831.)

26400. Strong, H. V., and Eisler, P.—Method of manufacturing electrical circuits and circuit components. 1st November, 1948. (685912.)

33302. Philips Electrical, Ltd.—Automatic frequency-control circuits for valve oscillators. 17th December, 1947. (685991.)

1948

9671. Wallauschek, R.—Travelling wave amplifier apparatus. 6th April, 1948. (685752.)

16881. British Thomson-Houston Co., Ltd.—Waveguides for electric discharge devices. 23rd June, 1948. (685753.)

20594. Automatic Electric Laboratories, Inc.—Telephone systems. 4th August, 1948. (685832.)

1949

7825. Electronic & X-Ray Applications, Ltd., Tunnicliffe, E. A. J., and Matthews, H. C. H.—Recording apparatus. 22nd June, 1950. (685758.)

15563. Standard Telephones & Cables, Ltd.—Valve voltmeters. 2nd June, 1950. (685996.)

20818. National Research Development Corporation.—Lighting fittings. 10th August, 1950. (685921.)

24754. Coop, N. B.—Electric clocks. 11th January, 1950. (685766.)

26317. Telephone Manufacturing Co., Ltd.—Indicating mechanisms. 27th September, 1950. (685926.)

28989. Edison Swan Electric Co., Ltd.—Cathode-ray tubes. 12th February, 1951. (685767.)

31427. British Thomson-Houston Co., Ltd., Cox, H. E., Roxburgh, A., Trencham, H., and Pollard, A. H.—High-voltage electrical circuit breakers. 16th February, 1951. (685927.)

1950

737. Pye, Ltd., and Theile, R.—Method of and apparatus for recording pictures. 25th January, 1951. (686009.)

914. Philips Electrical Industries, Ltd.—Circuits for use in automatic telephone exchange and like systems. 13th January, 1950. (685771.)

1292. Heil, O.—Electron gun and amplifier employing the same. 18th January, 1950. (685846.)

1879. Metropolitan-Vickers Electrical Co., Ltd.—Construction of tubular heat exchangers. 20th November, 1950. (685848.)

3010. General Electric Co., Ltd., and Dale, S. H.—Electric converting systems. 6th February, 1951. Cognate application 20538, 18th August, 1950. (685774.)

5122. General Electric Co., Ltd., and Bryden, J. E.—Electrical signalling systems. 28th February, 1951. (685852.)

5123/4. General Electric Co., Ltd., and Bryden, J. E.—Electric phase-splitting networks. 28th February, 1951. (685853/4.)

5771. Pye, Ltd.—Tuning device. 7th March, 1951. (685856.)

5871. General Electric Co., Ltd., and Sowter, A. B.—Cold pressure welding. 21st February, 1951. (685931.)

7086. Soc. Francaise Radio-Electrique.—Transmitters and receivers for frequency modulated waves. 21st March, 1950. (686014.)

7746. Radio Corporation of America.—Electro-mechanical filters. 28th March, 1950. (686016.)

8492. Yardney International Corporation.—Electric secondary cells or accumulators. 2nd April, 1951. (685778.)

9601. Philips Electrical Industries, Ltd.—Electric fittings and supply terminals therefor. 19th April, 1950. (686021.)

12365. General Electric Co., Ltd., Brabham, H. B. S., and Townsend, G. B.—Chassis for mounting electrical components. 17th May, 1951. (685861.)

12372. Pye, Ltd.—Television receivers. 17th May. 1951. (685862.)

13315. British Dielectric Research, Ltd.—Manufacture of metallized polytetrafluorethylene and products thereof. 25th May, 1951. (686031.)

1951

239. British Thomson-Houston Co., Ltd.—Refrigerator control. 3rd January, 1951. (686057.)

2054. Standard Telephones & Cables, Ltd.—Reciprocatory flat switches for automatic telecommunication

NEXT WEEK'S EVENTS—*continued*

Thursday, 11th December

BRISTOL.—Electricity House, Colston Avenue, 7 p.m. I.E.E. Bristol Students' Section. Students' lecture, "Electrical Safety Precautions," by H. W. Swann.

DUNDEE.—Royal Hotel, 7 p.m. I.E.E. North Scotland Sub-Centre. "A Logical Approach to the Problems of Electric Space Warming," by D. H. Parry.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "The Royal Festival Hall: Electrical Installation," by J. G. Hunter.

MAIDSTONE.—Royal Star Hotel, 8 p.m. A.S.E.E. Kent Branch. "Radar Aids to Navigation," by Group Capt. E. Fennessy.

MANCHESTER.—Demonstration Theatre N.W.E.B., Town Hall Extension, 6 p.m. I.E.S. Manchester Centre. "A Short Investigation into Stroboscopic Effect," by E. Smith.

SWANSEA.—Central Public Library, 6 p.m. I.E.E. West Wales Sub-Centre. "Standardization and Simplification in the Electrical Industry," by J. T. Moore.

Friday, 12th December

LIVERPOOL.—9, Whitechapel, 7.30 p.m. A.S.E.E. Liverpool Branch. Lecture and Test Demonstration: "The Dorman Miniature Circuit Breaker," by H. W. Wolff.

LONDON.—Windsor Castle Hotel, Victoria, S.W.1, 7 p.m. Electrical Trades' Commercial Travellers' Association. Annual dinner-smoker.

NEWCASTLE-ON-TYNE.—Literary and Philosophical Society's Lecture Theatre, 6.15 p.m. North East Coast Institution of Engineers and Shipbuilders. "The Application of Research to the Gas Turbine," by H. Constant.

Saturday, 13th December

MANCHESTER.—College of Technology. Manchester Association of Engineers. Conversazione and dance.

exchanges. 26th January, 1951. Addition to 663686. (685972.)

4308. Aktiebolaget Elektrolux.—Heating devices for washing boilers and like liquid heaters. 22nd February, 1951. (685813.)

5773. Philips Electrical Industries, Ltd.—Devices comprising a hollow guide to be supplied by a generator for ultra-high-frequency oscillations. 9th March, 1951. (686062.)

6786. Landis & Gyr. Akt. Ges.—Heat emitting apparatus such as space-heating radiators, and the like. 21st March, 1951. (686064.)

7918. British Thomson-Houston Co., Ltd.—Windings for dynamo-electric machines. 5th April, 1951. (686065.)

8925. Mallory & Co., Inc., P. R.—Spirally wound variable inductance devices. 17th April, 1951. (685818.)

11645. Rauland Corporation.—Cathode-ray tubes or the like. 18th May, 1951. (685821.)

15956. Electrolux Corporation.—Self-sealing dust bags for suction cleaners. 5th July, 1951. (685824.)

16550. Short Bros. & Harland, Ltd.—Telemetering apparatus. 12th July, 1951. (685903.)

16635. Allmanna Svenska Elektriska Aktiebolaget.—Anode tube for high-voltage ionic valves. 13th July, 1951. (685825.)

20167. Fairweather, H. G. C. (General Aniline & Film Corporation).—Process and means for preventing film deposits on water-cooled electric discharge lamps. 27th August, 1951. (685827.)

21463. Westinghouse Electric International Co.—Electric circuit interrupters having disconnect contacts. 12th September, 1951. (685828.)

23136. British Thomson-Houston Co., Ltd.—Coil spacers for stationary electrical induction apparatus. 4th October, 1951. (685829.)

25230. British Thomson-Houston Co., Ltd.—Juice extractors. 29th October, 1951. (685987.)

STREET LIGHTING NOTES

MR. W. V. M'Cleery, Minister of Commerce for Northern Ireland, switched on the new lighting at ANTRIM on 14th November. The scheme, which is the joint effort of the Town Commissioners and the Rural Council, extends over about three miles of trunk road. About 110 concrete standards carry the fluorescent lanterns, the majority of which are fitted with three tubes.

A new lighting scheme for the BROXBURN and UPHALL area of West Lothian providing for fluorescent lighting in the main shopping centres, and sodium lighting in other main roads, is estimated to cost £16,500.

STIRLING Corporation proposes to seek sanction to borrow £17,985 for improving street lighting in the main streets.

OLDHAM Corporation Finance Committee has accepted a tender of the North Western Electricity Board amounting to £4,690 for sodium lighting of Holt's Estate.

Ediswan "London Minor" lanterns on Standard type 7B columns installed in the burgh of Ayr

DARLINGTON Corporation has approved an estimate submitted by the North Eastern Electricity Board at £9,000 for improving the lighting of Haughton Road, Darlington, by the installation of sodium electric lamps. Sanction has been received to borrow £4,470 for the installation of improved lighting in Coniscliffe Road between Grange Road and Salutation Road, Darlington.

PETERBOROUGH Corporation Highways Committee has received the consent of the Minister of Housing and Local Government to the borrowing of £1,960 for the installation of improved street lighting in Westwood Street and Walpole Street.

BOLDON (Durham) U.D.C. has accepted the estimate of the North Eastern Electricity Board, at £907, for the supply and erection of 28 street lighting units on the West Boldon housing site (section 3).

GATESHEAD Town Council has received sanction to borrow £12,650 for the installation of cables in connection with the second stage of the street lighting electrification scheme.

HYDE Corporation is recommended to approve street lighting costing £2,330 on the Cheetham Fold Estate.

DURHAM County Council has consented to the borrowing of £3,000 by Trimdon Parish Council for the provision of electric street lighting.

BURY ST. EDMUNDS Corporation has authorized the borough engineer to prepare a scheme for the improvement of the lighting of the trunk road (A.45).

NOTTINGHAM City Council is recommended to seek sanction to borrow £6,435 for street lighting in Wilford Lane and Clifton Lane.

COVENTRY Corporation has received sanction to borrow £8,000 for improved lighting in Hearsall Lane and Tile Hill Lane.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 17th December. Victorian Railways Commissioners. Telephone cable. (C.R.E. 40026/52. Ten/5223.)*

Belfast.—2nd January. City Council. Feed water equipment for Victoria power station. (See this issue.)

16th January. Metering equipment for Victoria power station. (See this issue.)

Blackpool. — 20th December. Corporation. Supply of 1,000 synchronous motor type switches. (See this issue.)

Burton-on-Trent.—23rd December. Street lighting equipment. (See this issue.)

Gainsborough. — 12th December. U.D.C. Six assemblies for lighting pedestrian crossings. Surveyor, Council Offices, Lord Street.

India.—BANGALORE.—15th December. Stores Purchasing Committee, Government of Mysore. House service meters. (C.R.E. 39514/52. Ten/5212.)*

Luton. — 18th December. Town Council. Electrical installations in six blocks of flats (48 dwellings), Farley Hill estate. Town clerk.

Manchester.—17th December. Corporation. Street lighting equipment. (See this issue.)

New Zealand.—WELLINGTON.—20th January. Post and Telegraph Department. Supply of 100 miles of p.v.c. insu'ated three-core cable. (C.R.E. 38563/52. Ten/5188.)* Electrolytic condensers. (C.R.E. 39487/52. Ten/5218.)* 23rd January. Engine-generator sets. (C.R.E. 39486/52. Ten/5216.)*

Northwich.—15th December. U.D.C. Power points in 71 houses on various sites. Housing manager, Witton Street Library.

South Africa. — PRETORIA. — 1st January. Union Tender and Supplies Board. Airfie'd control radio telephone systems. (C.R.E. 39347/52. Ten/5196.)* 8th January. Fixed frequency radio communication receivers, accessories and spares. (C.R.E. 39490/52. Ten/5217.)* 12th February. Automatic high speed telegraph apparatus for the S.A. Air Force. (C.R.E. 39488/52. Ten/5198.)*

Sowerby Bridge.—18th December. U.D.C. Electrical work for 26 houses and flats, Karshaw House site, Luddenden Foot. Surveyor, Beechroyd, Beech Road.

Taunton. — 29th December. Corporation. Public lighting equipment. (See this issue.)

Thailand. — BANGKOK. — 15th December. Stores Office, Railways Organization. Watthour meters. (C.R.E. 39371/52. Ten/5213.)*

Uruguay. — MONTEVIDEO. — 7th January. Usinas Electricas y Telefonos del Estado. Supply of underground armoured cables. (C.R.E. 38630/52. Ten/5203.)* 9th January. Supply of electric cables. (C.R.E. 39762/52. Ten/5202.)*

ORDERS PLACED

Grimsby. — Corporation. Recommended. Electrical installation, Chelmsford Avenue Secondary Modern Boys' School (£8,485).—N. G. Bailey & Co., Ltd.

Newcastle-on-Tyne. — Regional Hospital Board. Electrical installation in triple operating theatre at Shotley Bridge Hospital (£1,858).—T. G. Usher & Co., Ltd.

Northampton.—Highways Committee. Accepted. Conversion of lighting in certain streets from gas to electricity (£7,339).—East Midlands Electricity Board.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bolton.—Reconstruction of business premises, 9-13, Knowsley Street; Stephenson & Gillis, architects, North Street, Newcastle-on-Tyne.

Boston.—Block of three shops, London Road estate, Wyberton; R.D.C. architect.

Bradford.—Second portion of Margaret McMillan Memorial Training College (£139,100); Harrison & Co. (Leeds), Ltd., builders, Pudsey, Leeds.

Cheadle.—Rebuilding Cecilly Brook Mills; Brough, Nicholson & Hall, Ltd., Leek.

Corby.—Houses (300), and factory (12,000 sq. ft.) for Deve'opment Corporation; R. F. Brooks Grundy, general manager, The Stone House, South Road.

Grammar school for Northants E.C.; county architect, Northampton.

Crawley.—Dwellings (1,042), on sites 2, 3, 4 and 5 at Langley Green, for the Deve'opment Corporation; chief architect, Broadfield, Crawley, Sussex.

Daventry. — New factory, London Road; Kneller Instrument Co., Ltd., Hillmorton Road, Rugby.

Houses (68), Dryden Avenue, borough surveyor, Moot Hall.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, Whitehall, S.W.1 (Trafalgar 8855).

Dewsbury. — Houses, Broomer Street and Red Laithes Lane (72) and Spen Valley Road (68) and bungalows (8), Green Lane (No. 3) site; borough engineer.

Doncaster.—Extensions to Percy Jackson Grammar School (estimated cost £40,000); architect, Don Valley Divisional Education Executive, Doncaster.

Dudley.—Factory premises, Pear Tree Lane; Coleyshaws, Ltd., Pear Tree Lane.

Durham.—New County Hall; county architect, Court Lane, Durham.

Conversion of Windlestone Hall into a special school (£30,000) and conversion of Witworth House, Spennymoor, into school for subnormal children (£12,000); county architect.

Easington (Durham).—Houses (78), Wingate and Murton; R.D.C. surveyor.

Faversham. — Houses (50), North Preston; borough surveyor.

Ffestiniog.—Factory, Haygarth; Salem Engineering Co., Ltd., Milford House, Milford, Derby.

Gateshead.—Factory additions, Kyle Road, for Dandy Confectionery Co., Ltd.; Arthur & Kirkup, architects, 13, Swinburne Street.

Glasgow.—Steel foundry, offices, etc., at Tollcross Works; Stewarts & Lloyds, Ltd., 41, Oswald Street.

Gloucester.—Flats (18), Scott Avenue, Podsmead; city architect.

Grays.—Fire station (£45,000); county architect, County Hall, Chelmsford.

Great Yarmouth.—Houses, flats and maisonnettes (102); borough surveyor, 15, Regent Street.

Harrogate.—Houses (350) during 1953-54; borough surveyor, Municipal Offices.

Hebburn-on-Tyne.—Houses (40), Mill Lane extension; U.D.C. surveyor.

Hoole.—Houses (32), Hoole House estate; R. Boot, architect, 22, Newgate Street, Chester.

Hove.—Home for aged persons, 31/33, Brunswick Road; Brighton & Hove Housing Society, Ltd., 30, Brunswick Road.

Lanchester.—Houses (36), Langley Park, Lanchester and Burnhope; R.D.C. surveyor, Council Offices.

Leicester.—Further 24 police houses; city architect.

London.—HAMMERSMITH.—Shops, showrooms and flats, King Street; R. Seifert, architect, 28, Great Ormond Street, W.C.1.

LEWISHAM.—Shop and eight flats, High Street; J. Sainsbury, Ltd., Stamford Street, S.E.1.

WANDSWORTH.—Dwellings (169), Wimbledon road; borough engineer.

Luton. — Transport depot, Dallow Road; Laporte Chemicals, Ltd., Kingsway.

Manchester.—Flats (96), Wilmslow Road, for Westbourne Investment Co., Ltd.; A. R. Johnson, architect, 11, Peter Street, Manchester.

Middlesbrough.—Additional storey for offices in Eastbourne Road for Thompson's Enterprises, Ltd., and additional storey for showroom in Newport Road for Eaton & Co.; Kitching & Co., architects, 21, Albert Road.

Newcastle-on-Tyne.—Joinery works, Huddleston Road, for Universal Joinery Works; P. L. Higgs, architects, 75, Denehan Gardens.

Houses (18), Armstrong Road and Roberts Street; city architect, 18, Cloth Market.

Clothing factory additions, High Bridge, for Paul & Sons; C. Solomon, architect, St. Mary's Place.

Northwich. — Victory Memorial Hall for U.D.C.; Elleray & Wallace, architects, Northwich.

Old Fletton (Hunts).—Houses on Chapel Street extension site for U.D.C.; Ruddle & Wilkinson, Longcauseway, Peterborough.

Preston.—Extensions to factory of Remploy, Ltd., Deepdale Street; J. Turner & Sons, Ltd., William Henry Street.

Pwllheli. — Adaptation of Town Hall as theatre and cinema; Wells Coates, architect, 18, Yeomans Row, London, S.W.3.

Radcliffe.—Fire station, Radcliffe New Road (£35,000); G. Noel Hill, Lancs county architect, Fishergate Hill, Preston.

Redditch.—Ambulance station, Cedar Park Road; county architect.

Secondary modern school, Studley Road; L. C. Lomas, architect, 14, Castle Street, Worcester.

Rochester. — Houses (331), on four sites; city surveyor, 66, Maidstone Road.

Rothwell (Northants). — New housing estate, Harrington Road; Council's architect.

Rugby.—Plan for development of Abbotts Farm housing site, with provision for 750 dwellings, with shops, school, etc., at a later date; borough surveyor, Burford House, Church Walk.

St. Helens.—School kitchen and dining room for 750 meals, Robins Lane; borough engineer.

Sheffield.—New general teaching hospital at Glossop Road for United Sheffield Hospital Board; Adams, Holden & Pearson, architects, 2, Gordon Square, London, W.C.1.

Skelton (Yorks).—Houses (16), Wandhill, Boosbeck, for U.D.C.; surveyor, Council Offices, Skelton-in-Cleveland.

Stockport.—Rebuilding of premises, Lower Hillgate; Architects' Department, Montague Burton, Ltd., Hudson Road Mills, Leeds.

Stoke-on-Trent.—Further reconstruction of premises for W. T. Copeland & Sons, Ltd., Spode Works; Hind & Brown, architects, 2, Market Street, Hanley.

Sunderland. — Conversion of laundry into X-ray department at Havelock Hospital for Newcastle Hospital Board; Barrett, Sons & Partners, quantity surveyors, 17, Brunswick Place, Newcastle-on-Tyne.

Tipton.—Factory extensions at Great Bridge; George Hipkins, curers, 64, Great Bridge.

Walsingham.—Houses and bungalows (42), in three parishes; housing officer, 10, The Square, Fakenham, Norfolk.

Warlingham. — County secondary school (£179,155); J. Harrison, county architect, County Hall, Kingston-on-Thames.

Welwyn Garden City.—Houses (245), flats (24), and garages, Scheme No. 16; R. E. N. Lowe, architect, Pomeroy House, Basinghall Street, London, E.C.2.